

JUNE 1958

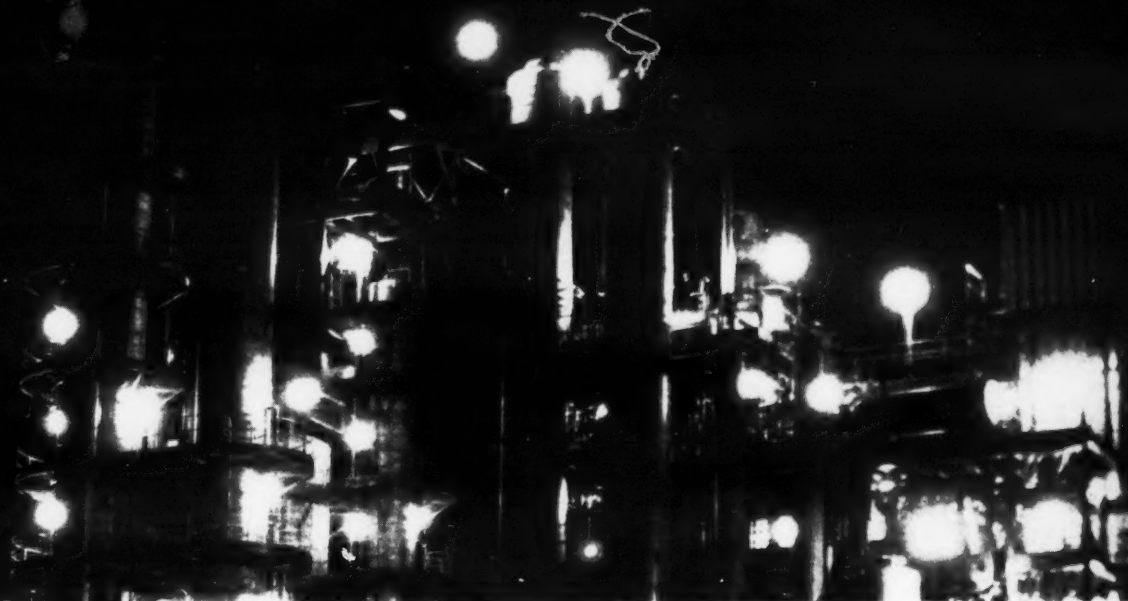


CHEMICAL PROCESSING

Squibb's fermentation-air control system
safeguards quality, cuts costs 90

GE assures safety in pneumatic handling
of potentially explosive wood flour . 184

... plus many more "how they do it"
reports for the processor 6



L. D. SMITHERS, President,
Dow Chemical of Canada, sees

CONTINUED BOOM FOR CANADIAN PETROCHEMICALS

Investment now \$400 million—could grow 8 to 10% a year as marketing,
tariff problems are solved — page 75





How B&A® meets your needs for BORON TRIFLUORIDE

Gas and Complexes

With large-scale production . . . Baker & Adamson has long been the leader in production of BF_3 gas—shipping this versatile catalyst in large trailer trucks like those you see being loaded above. B&A pioneered this method of shipment and today has a fleet of these trucks always on the road, serving the needs of the process industries.

With reference data . . . Baker & Adamson has compiled a considerable amount of reference data on the applications of Boron Fluoride gas and complexes. Boron Fluoride's wide range of applications and its cost-cutting production advantages—such as its ease of catalyst removal—

make it a factor to be considered in almost any organic synthesis problem.

Mail coupon today—for technical data on properties and typical uses of B&A Boron Trifluoride gas or any of the complexes listed below. Attach company letterhead, please.

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Boron Fluoride Para-cresol Complex
Boron Fluoride Triethanolamine Complex
Boron Fluoride Urea Complex

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.



Check 5422 opposite last page



that's interesting

Big inch, little inch

While the international meter is known with an accuracy of about one part in ten million, translation of this meter into terms of inches has led to some differences. At the present time, the Canadian inch has been defined as exactly 2.54 cm. This is two parts per



"Looks like we forgot the difference in the size of the inch."

million smaller than the US standard, and about two parts per million larger than the British standard. Advances in modern industrial technology have now reached a stage where efficient interchangeability is impaired by these differences. (*Technical News Bulletin*, National Bureau of Standards)

Universal time

The exact moment of any event, anywhere on earth, to the nearest thousandth of a second can be measured by a "world time clock." Clock was developed by Edgerton, Germeshausen & Grier, Inc. for nuclear testing. It takes broadcast time signals and by means of a differential gear and stroboscopic setup is set precisely.

A quick chemist

A complete chemical analysis in one ten-thousandth of a second is the task performed by the "Time-of-Flight Mass Spectrometer" produced by Bendix Aviation Corp. Instru-

Mail Coupon for Data



BAKER & ADAMSON® Fine Chemicals
GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y. CP-6

☐ Please send general information on properties and uses of Boron Trifluoride gas ☐

_____ complex ☐

☐ Please send information on Boron Trifluoride for the following application:

Name _____

Position _____

Company _____

Address _____

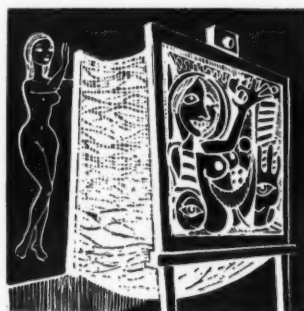
City _____ Zone _____ State _____

... Thought-provoking slants
on projects and products

ment operates on principle of instantly identifying vaporized gases, liquids, and solids by revealing their respective molecular masses. Unit can analyze an instantaneous sequence of chemical reactions such as takes place in explosion of rocket fuels.

Flexible light

A well-aligned bundle, or "rope", of glass fibers can be used for the transmission of optical images "around corners." This development known as "fiber optics" is based on the property of transparent dielectric fibers to isolate an element of an image and convey it to another point along a flexible path. Possible uses include a flexible gastroscope,



"Picassoan coder" using fiber optics

"crypto-photography" (an optical device for coding and decoding photographs, maps, and written matter), and various photographic systems. (*The Frontier*, Armour Research Foundation)

No-ice flower package

A flower-shipping innovation uses a polyethylene-film wrap to keep carnations garden fresh in transit without ice. By sealing in moisture given off by the flowers, film creates a humid atmosphere that maintains freshness for at least three days. The nearly airtight film pack (it is not heat sealed) also retains much of

To page 5



New, patented feature of Airstream Conveyors

Now Dracco Airstream Conveyors offer you an exclusive feature which eliminates the formation of "ribbons" or "streamers" on pipeline walls in the pneumatic handling of polyethylene and similar plastics.

A special Dracco patented treatment* prevents the linear build-up of polyethylene which occurs in untreated conveying lines. This unique development assures unrestricted material flow and avoids the fouling of extruders, injectors and other production machinery.

New 32-page brochure presents detailed information on how Dracco Airstream Conveyors have solved bulk materials handling problems. Write for Bulletin 530.

Ribbon-free polyethylene conveying is an important addition to the many other advantages of Airstream Conveyors:

- any degree of automation
- contamination-free handling with completely enclosed, air-tight systems
- conveying air can be purified by filtration and drying
- optional controlled atmosphere systems using inert gases
- self-cleaning . . . dust-free
- no moving parts . . . no metal-to-metal contact

- stainless steel or aluminum construction

To be sure of efficient and economical handling of polyethylene—or any high-purity bulk material—specify Dracco Airstream Conveyors . . . now available with the new ribbon-free feature.

*U.S. Patent No. 2,784,038

DRACCO DIVISION OF FULLER CO.

4070 East 116th Street • Cleveland 5, Ohio

DRACCO airstream conveyors
dust control equipment

Check 5423 opposite last page

THERMAL

SUBMERGED COMBUSTION



**simplicity of
design and
construction...
plus extreme
compactness**

HEAT INPUTS OF 250,000 BTU/hr to 5,000,000 BTU/hr

The high heat release rate of the THERMAL High Velocity burner used in these submerged combustion installations allows the use of a simple downcomer tube through which the products of combustion are discharged beneath the surface of the liquid. This arrangement is possible because combustion is 90% completed within the burner proper. The THERMAL burner is completely separate from the liquid being heated and maintenance, control and accessibility are greatly simplified. Equally simple arrangements are possible with gas, oil or combination fuel.

BROAD RANGE OF APPLICATIONS

Depending upon the material being heated either a metal or refractory downcomer tube may be used. Some of the more common applications are pickling baths, acid concentration, caustic soda concentration, aluminum sulphate concentration, water recarbonization, and glass frit and molten salt heating.

OTHER THERMAL PRODUCTS & SERVICES



WRITE FOR BULLETIN #110

Gas, Oil & Combination Burners
• Air Heaters • Combustion
& Heat Transfer Equipment

THERMAL

Thermal Research & Engineering Corp.
CONSHOHOCKEN • PENNSYLVANIA
REPRESENTATIVES IN PRINCIPAL CITIES

Check 5424 opposite last page

CHEMICAL PROCESSING

with which is combined
CHEMICAL PROCESSING PREVIEW
and Chemical Business

For the management team

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June 1958

No. 6

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This issue of **CHEMICAL PROCESSING** magazine distributed to more than 50,000 members of the Management Team, wherever chemicals and chemical processes are involved:

Basic Chemical and Chemical Processing Industries

Industrial inorganic & organic chemicals (acids, alkalis, plastics, synthetic fibers, explosives, etc.)
Drugs & medicines
Soap & cleansing products
Paints, varnishes, lacquers
Gum & wood chemicals (Naval Stores)
Fertilizers

Animal & vegetable oils & fats
Miscellaneous chemicals (cosmetics & toiletries, inks, insecticides, water treatment chemicals, etc.)
Paper & allied products
Petroleum, coal, coke-oven products
Rubber products
Stone, clay & glass products
Atomic energy establishments

Other industries utilizing chemicals or chemical processes

Food and allied products
Textile dyeing & finishing
Leather tanning & finishing
Metals & alloys
Machinery & equipment

Allied products (tobacco, photographic film, instruments, fabricated plastic products, etc.)
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Specialized services to the chemical processing field

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OTHER SUBSCRIPTIONS — from "non-qualified" persons (those who are not key processing men in the chemical industries) — are accepted at \$1.00 the copy, or \$10.00 the year. Such subscriptions are not counted as "industry circulation" on BPA audit reports.

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CHEMICAL PROCESSING

THAT'S INTERESTING

From page 3

the carbon dioxide given off by the blooms and it is possible that the CO₂ buildup slows plant breathing and thus helps to arrest deterioration. (Modern Packaging.)

Atomic schooling

The drive for more students of science and engineering is being assisted, at the Franklin Institute, Philadelphia, by means of an atomic-reactor demonstration. "Atoms from Kilowatts" demonstration shows how electric power may one day come from atomic energy, using a reactor as a boiler to supply turbo-generator steam. Instruments are fed with signals that cause them to operate exactly as they would on a genuine unit.

Puppets? Positively!

Animated tri-methylated melamine molecules are making a pitch for American Cyanamid. "Uncle Cy Does His Paper Work — or the Egg-head That Hatched" is a four-character puppet presentation the Paper Chemicals Department is using to tell paper people the story of its product and process for imparting wet-strength to paper with melamine resin.

Shaveless surgery

Hexachlorophene may be helping to diminish anxiety over head surgery. Twenty operations have been successfully performed in which brain surgery did not necessitate shaving the patient's head. Before surgery, hair was shampooed repeatedly with hexachlorophene to sterilize the scalp. The hair was parted at the area of incision and kept flat and secure with a non-lacquer wave-set compound. (Sindar Reporter, Sindar Corp.)

More "That's Interesting" items are on pages 25, 125, 163.

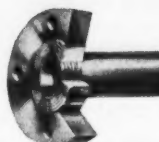


3 BIG REASONS WHY...

1. FLANGE WITHOUT WELDING



Faster than welding... easier than welding. A Speedline Insert Flange assures a leak-proof, expanded joint every time. Saves assembly time and costs!

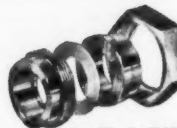


Gateway view shows pipe expanded into Insert Flange

2. LEAKPROOF UNION JOINTS

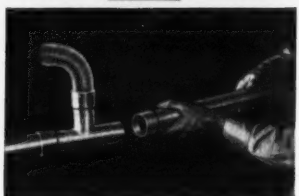


Speedline Unions are gasket seated to prevent leakage... bi-metallic for easy make-up and disassembly without galling or seizing. Available in two types: PE for expanding or PW for welding to Sch. 5 or 10 pipe and Speedline Fittings.



Type PW—For Welding

3. EASIER, FASTER ALIGNMENT



Speedline Aligning Connectors fit over pipe ends... save time in aligning the most complex layout—permit preassembly prior to welding or brazing!



PLUS SPEEDLINE'S "EXTRA LENGTH" FEATURE—There's an extra straight section on every end of every Speedline elbow, tee, reducer, bend and cross. This means extra clearance for welding and also facilitates joining with flanges or unions. Speedline Fittings, designed especially for use with Schedule 5 and 10 light wall stainless pipe, offer installation advantages and other cost savings not possible with conventional fittings. Write today for Speedline catalog or contact nearest Distributor.

Speedline STAINLESS STEEL FITTINGS
THE NEWEST THING IN PIPELINE ECONOMY



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Check 5425 opposite last page

highlights

**CHEMICAL
PROCESSING**

volume 21

number 6

June 1958

CHEMICAL BUSINESS

Determining Your Share of A Market — Robert L. James	26
Individual versus Team Research — W. J. Kroll	29
Economics of Radiation in Chemical Processing — L. G. Cook ..	31
The Borden Chemical Story — A CB Profile	36
Here's What's Wrong with Our A-power Program — Joseph E. Moody	42
Marketing Trends — Dry Laundry Detergents Hold Lead	45

U. S. and WORLD PETROCHEMICALS

Canadian Petrochemicals Still Surging Forward — L. D. Smithers	75
Furnaces Provide High Ethylene Conversion, Low Maintenance ..	82

NEW PROCESSING TECHNIQUES, MATERIALS and EQUIPMENT

CHEMICAL MATERIALS

Transition metal chlorides: chemical comers	50
Elastomer resists organics at 600°F	57
Copper hydrate complex has high toxicity, stability	62

NEW SOLUTIONS OF PROCESSING PROBLEMS

Automatic control of process air pays off for Squibb	90
Finding the best silicone fluid for "all-temp" grease	95
'Depth' filtration removes plastic haze	100

IDEAS

Dust loss from cement process is below 1%	109
Demineralizer furnishes water with 0.001 ppm silica	114

PROCESS INSTRUMENTATION & LABORATORY APPARATUS

Moisture tester cuts costs on critical steeping process	122
Laboratory test time minimized with sonic sifter-filter	132

CORROSION CONTROL

Uranium plant prevents corrosion with rubber-lined tanks	141
Plastic pipe can withstand 500 psi	150

MATERIAL HANDLING & PACKAGING

Unloads open-top hopper car in 60 seconds	155
Mobile loading ramp reduces shipment handling	164

PROCESSING EQUIPMENT

Dryers assure optimum retention time	172
Sift, filter, and de-water with sonic vibrations	180

PLANT ENGINEERING MAINTENANCE & SAFETY

Pneumatic handling system has built-in safety	184
Easily cleaned plug valves simplify flow control	194

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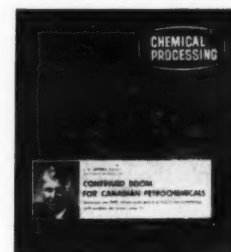
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THIS MONTH'S COVER

... shows L. D. Smithers, president of Dow Chemical of Canada against a background night photograph of Dow's styrene plant at Sarnia, Ontario. In the Sarnia area of Canada alone, about \$175 million is invested in petrochemical plants. Mr. Smithers, in a story starting on page 75 tells about the tremendous boom in petrochemicals that has occurred in Canada the past few years. He states that outlook for the future is bright despite tariff and marketing problems.



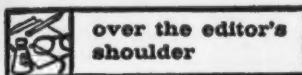
REGULAR FEATURES

That's Interesting	2	Spotlight on People	48
Conventions & Exhibits	8	Engineering Data	103
Watching Washington	10	Recent Books	203
Highlights for Next Month	13	New Literature	208
Letters from Readers	15	Advertisers Index	231
Nuclear Notes	19	Sales Representatives	233

SPECIAL READER SERVICES

• For more information on articles and advertisements in this issue, check the Reader Service slip opposite last page

• To subscribe to this magazine, see reader-qualification form opposite last page



over the editor's
shoulder



Notes on communication

One of our recent communications, published in the March issue, began:

"One of the obvious approaches to 'Solving the Manpower Shortage' has been completely overlooked by your article — and, so far as I can tell, by all of the armchair experts in the field.

Does it ever occur to author Schremp that there are at least thousands of technical people selling insurance, working in offices, or (as Mr. Schremp himself) writing for a living? Why should this be? I suspect earning power has something to do with it. If a real technical manpower pinch ever develops to the 'we'll pay more' stage, it will solve itself."

We're delighted to have letters of this type, however critical. Although we're constantly in touch with our readers, probing for opinions and feelings on controversial subjects, we need these voluntary comments. They help to further round out our knowledge of readers' viewpoints.

Authors and contributors are not "armchair experts" — they are men faced with problems of managing and operating chemical processing plants. There will always be difference of opinion even among those well informed — and our "Letters to the Editor" column offers readers a chance to air these differences.

So whether you're "for us or agin us," let us hear from you.

Bill Schremp

Chemical Business Editor

HOW YOU CAN BE SURE YOUR SOLID-LIQUID SEPARATIONS AREN'T COSTING YOU TOO MUCH

Don't let existing methods and equipment go at that.

Making certain that this vital part of the process is being done in the most effective, most economical way involves just two simple steps:



1 Talk it over with technical experts on solid-liquid separations with twenty-eight years of experience to draw on and with the company that engineers and builds the most complete range of equipment for this purpose.



2 Make use of the finest facilities available for solid-liquid separating tests, staffed by engineers who specialize on this single, important phase of chemical processing — at the Bird Research and Development Center.

LEADING AUTHORITY ON SOLID-LIQUID SEPARATIONS

BIRD
MACHINE COMPANY

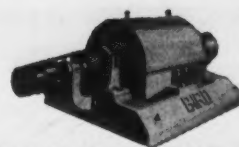
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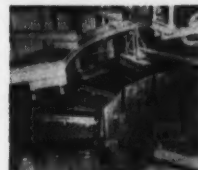
Bird Continuous Solid Bowl Centrifugal Filters



Bird Continuous Screen Type Centrifugal Filters



Bird-Humboldt Oscillating Screen-Centrifugals



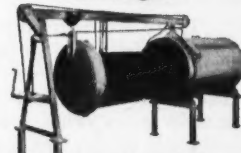
Bird-Prayon Horizontal Tilting Pan Vacuum Filters



Bird-Young Continuous Rotary Single Cell Vacuum Filters



Bird Suspended Batch Centrifugals



Bird Horizontal Tank Vertical Leaf Pressure Filters

Check 5426 opposite last page

Digs More . . . 4,500 lbs. breakout force

Carries More . . . 2,500 lbs. carry capacity

**Delivers More . . . with power-shift
.. than ever before!**



All-New H-25 PAYLOADER®

The most important fact about this outstanding new machine is that it will handle more material per hour and at less cost per ton than any front-end loader anywhere near its size.

It has a carry capacity of 2,500 lbs. with a wide range of operating speeds, yet it goes in and out of boxcars with 6-ft. doors to load or unload them.

The two-speed full-reversing power-shift transmission with torque converter and its power steering are big reasons why it can produce all-out all day without operator fatigue.

There are many other features that put the H-25 in a class by itself . . . in productivity, ease of operation and low maintenance. A variety of attachments, quickly interchangeable with the bucket, are also available to handle many other materials besides bulk loads.

Your Hough Distributor is ready to show you that the H-25 can dig more, carry more and deliver more bulk than you ever saw this size of machine handle before.

Ask about . . .



Now your Hough Distributor has at his disposal the broadest and most complete set of financing plans ever offered: — TIME PAYMENT . . . LEASING PLANS, with or without OPTION TO PURCHASE — any and all kinds of financing to best fit your needs.

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Send complete data on the outstanding new model H-25 "PAYLOADER".

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Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

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**conventions
and exhibits**

May 31-June 8.ACHEMA 1958, 12th Chemical Engineering Exhibition and Congress, Frankfurt am Main, Germany.

June 1-6. Ninth Annual Industrial Research Conference, Columbia University, New York.

June 2-6. American Society for Testing Materials, Sixth Annual Meeting on Mass Spectrometry, Jung Hotel, New Orleans.

June 5-6. Commercial Chemical Development Association, meeting, Niagara Hotel, Niagara Falls, New York.

June 9-11. American Association of Spectrographers, Ninth Annual Symposium on Spectroscopy, Pick-Congress Hotel, Chicago.

June 9-12. National Materials Handling Exposition, Public Auditorium, Cleveland.

June 9-13. Fourth International Automation Congress and Exposition, Coliseum, New York.

June 10. Synthetic Organic Chemical Manufacturers Assn., luncheon meeting, Hotel Roosevelt, New York.

June 12-14. Manufacturing Chemists' Association, 86th Annual Meeting, The Greenbrier, White Sulphur Springs, West Va.

June 14-16. American Society for Testing Materials, Hotel Statler, Boston.

June 15-19. American Society of Mechanical Engineers, Semi-annual Meeting, Statler Hotel, Detroit.

June 19-21. Heat Transfer and Fluid Mechanics Institute Meeting, University of California, Berkeley.

June 22-27. American Institute of Chemical Engineers, 50th Anniversary Meeting, Bellevue-Stratford Hotel, Philadelphia.

June 23-25. American Society of Heating and Air-Conditioning Engineers and The American Society of Refriger-

Check 5427 opposite last page

... Meetings and shows of interest to the chemical industries

erating Engineers, Joint Meeting, Hotel Leamington, Minneapolis.

June 26-27. The Society of the Plastics Industry, Midwest Section Conference, French Lick-Sheraton Hotel, French Lick, Indiana.

July 28-August 1. Technical Association of the Pulp and Paper Industry, 13th Engineering Conference, Multnomah Hotel, Portland, Oregon.

August 11-13. Western Packaging & Materials Handling Exposition, Civic Auditorium, San Francisco.

August 19-22. Western Electronic Show and Convention, Pan Pacific Auditorium, Los Angeles.

September 4-5. International Conference on Air Pollution, American Society of Mechanical Engineers, Hotel Statler, New York.

September 7-12. American Chemical Society, National Meeting, Chicago.

September 9. Synthetic Organic Chemical Manufacturers Assn., luncheon meeting, Hotel Roosevelt, New York.

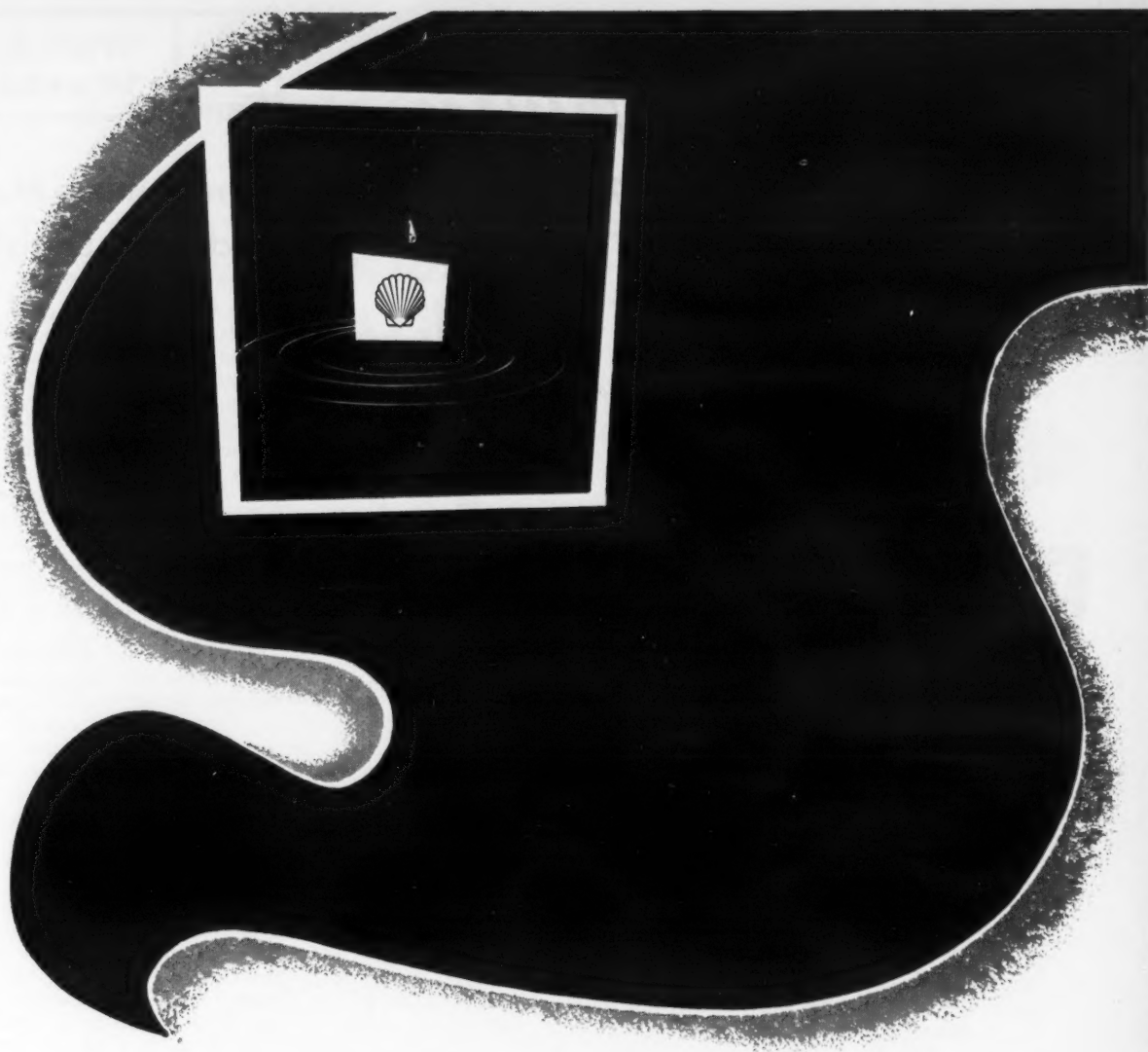
September 9-12. Tenth National Chemical Exposition, International Amphitheatre, Chicago.

September 15-19. Instrument Society of America, Annual Instrument-Automation Conference and Exhibit, Pennsylvania Convention Hall, Philadelphia.

September 21-24. American Institute of Chemical Engineers, Regional Meeting, Hotel Utah, Salt Lake City.

September 28-October 2. Electrochemical Society, Fall Meeting, Chateau Laurier, Ottawa, Ontario, Canada.

October 5-8. Federation of Paint and Varnish Production Clubs, 36th Annual Meeting, and the 23rd Paint Industries' Show, Cleveland Public Auditorium, Cleveland.



EAK... higher solvency means better coatings at lower cost!

HIGH BOILING EAK... with its *high solvency* for nitrocellulose and most organic resins... is finding steadily increasing use in a variety of surface coating formulations.

Ethyl amyl ketone teams up with low-boiling MEK and medium-boiling MIBK to provide better flow and gloss and helps to eliminate dry overspray.

Also, EAK's slow evaporation rate helps minimize pinholing and bubbling in the film. It possesses superior blush resistance and good diluent tolerance.

EAK is also an important component of thinners for automotive, furniture and other lacquers. This high-boiler is also being used successfully in multi-color lacquers. Cellulose esters, vinyl polymers

and virtually all synthetic and natural resins are soluble in EAK.

And, EAK is now proving itself as a valuable intermediate in several industries.

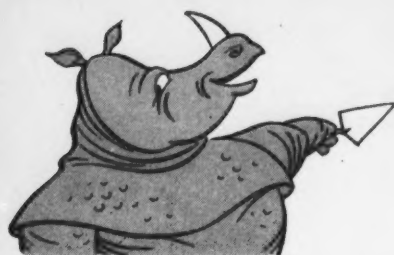
Your Shell Chemical representative will be glad to discuss your specific solvent needs with you. Write for ORGANIC CHEMICALS, a catalog of Shell solvents, resins and intermediates.

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EASY, ECONOMICAL REPAIR

OF CORRODED CONCRETE... WITH

NEW

Penntrowel

SURFACING COMPOUNDS

About to call in a contractor to replace badly corroded concrete, brick or cement surfaces in your plant? Don't pick up your phone yet! You can *repair* those eaten-away areas easily and economically with new PENNTROWEL.

PENNTROWEL is Pennsalt's new corrosion-proof resin surfacing. You mix PENNTROWEL right at the job site, then just *trowel it on*. It cures overnight for next-day service... bonds inseparably to the repaired surface, doesn't crack or slough off.

PENNTROWEL is tough! It combines high chemical resistance with impermeability... gives long service. It's proved itself on the job in Pennsalt's own fluorine, chlorine and caustic plants. Its three grades are tailored to meet any corrosion or wear application.

Write Today FOR PENNTROWEL FOLDER CP-627
AND INSTALLATION COST DATA

Corrosion Engineering Products Dept. 624
PENNSALT CHEMICALS CORPORATION
Three Penn Center, Philadelphia 2, Pa.
Penntrowel is a trade-mark of Pennsalt Chemicals Corp.



Check 5429 opposite last page



Watching Washington

Compromise May Push Food Additives Legislation

It looks as if Congress means business this time on the decade-old issue of food additive legislation. Rep. John Bell Williams (D., Miss.), chairman of the Health and Science subcommittee, aims to push legislation along its way to the statute books. According to Rep. Williams, ten years is a long enough "period of incubation."

The deadlock that occurred when former parent committee chairman Priest sought "substantial agreement" is expected to be broken by Rep. Williams' compromise theme. Williams champions compromise as the "essence of the legislative procedure."

However, any compromise won't solve the disagreement between industry groups and the FDA over the method of control. If Rep. Williams has his way, any compromise measure will contain the proviso that if the legislation proved unworkable, the committee would agree to reopen the matter.

Generally, industry groups agree that the Food, Drug and Cosmetic Act needs to be modernized to require both notice of use and safety-testing by the additive manufacturer in advance of use. Disagreement arises over method of control the Government is to have over additives (CHEMICAL PROCESSING, Jan 1958, p 48).

Industry does not believe the administration should be granted power to "license" use of an additive, which in effect the proposed law does. Under licensing control, a manufacturer of an additive would have to submit safety-testing data to FDA and would have to obtain specific FDA approval before this additive could be sold or used.

Industry feels that this provision would seriously impede research and restrict further progress in food chemistry.

The other point of disagreement between the two groups — that of definitions as to usefulness — will receive no compromise at all from the

FDA. Commissioner Larrick at recent hearings pointed to this as an "integral part" of any legislation. Industry stands firm in its view that "value" is to be determined in the market place.

And now that hearings are wrapped up, Rep. Williams is out to get a bill on the House floor in short order. In the interest of moving legislation out of the pending status, it may be that the committee itself will come up with a bill of its own.

On the other side of Capitol Hill, indications are that Senator Lister Hill (D., Ala.), chairman of the Public Welfare Committee, will give top priority to a House-passed additives bill and will move it onto the Senate floor.

States force Federal hand

The big push to get things wrapped up is coming from various States' Legislatures, which in effect are reflecting public restlessness. Agitation is growing over the delay in getting Federal legislation in the works. Any further delays will only add grist to the mill of the food faddists, and as more people hop on the fad-dist bandwagon, the urgency to get something done increases — or both industry and FDA will suffer.

The push from the States comes from New York which is considering food additive legislation of the "licensing" variety. New York City has under consideration sanitary code revisions to include food additive measures.

Utah has already enacted a law. In adopting its own law, Utah's Supervisor of Foods and Drugs told FDA:

"... this State found it necessary to pass a chemical additive amendment to our Food and Drug Law in order to attempt some control in this perilous field. Although we realize that individual laws of this nature passed by the various States do much to destroy the uniformity already gained in the field of food and drug legislation, we, nevertheless, felt that this area badly needed control, and it has been our thinking that if Congress passes chemical additive legislation... then we will seek an amendment in our law to obtain uniformity of legislation. Until Congress does pass such legislation, however, it is our feeling that this field should have some control at the State level."

Before it's too late for moderate legislation, perhaps FDA and industry should embrace the Williams' view of compromise.

Packaging groups eye proceedings

Packaging groups are actively watching what happens on food additive legislation. Objecting to the definition of "food additives" which would include packaging materials, they look for a clearer distinction between "food" and "food packages."

Packagers argue that the packaging component is not primarily intended to become a part of the food and its presence in food is rare. Few packaging components migrate to food in significant quantity; therefore, there is no hazard to public health.

But FDA wants food packaging components subject to control under law. Food packagers would have to prove containers safe, and then when proved safe, use them only in accordance with a detailed regulation.

Packaging groups are on record as favoring policing rather than licensing, retention of the Grandfather Clause, and rejecting the

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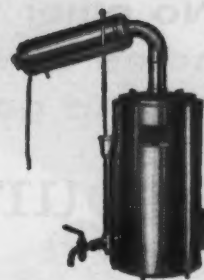
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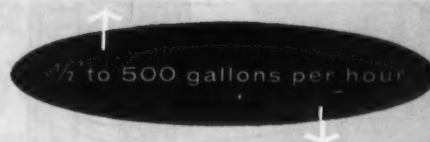


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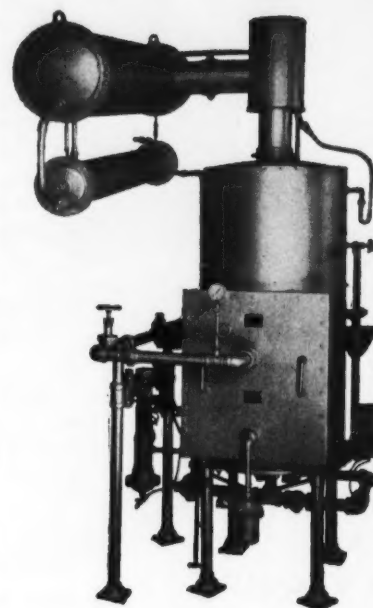
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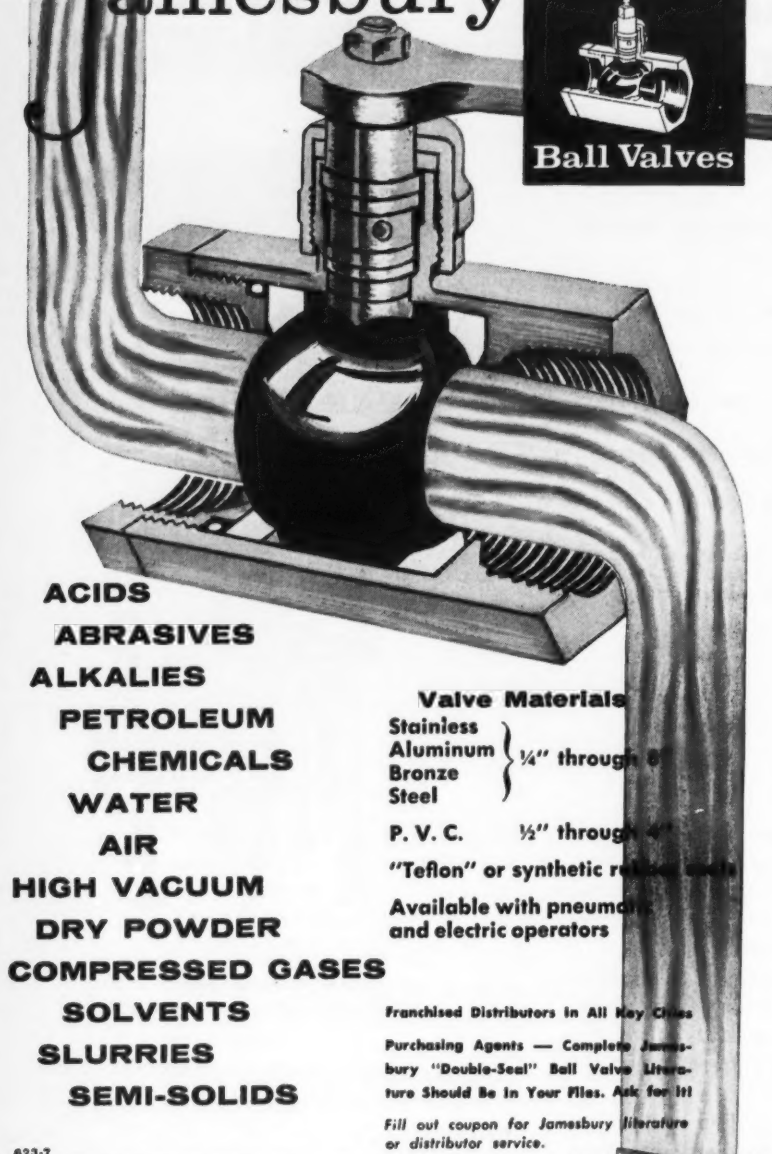
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WASHINGTON NEWS

functional value test.

American Paper and Pulp Association was among those emphasizing that millions of dollars are spent annually to evaluate health aspects of food packaging materials.

Kenyon Loomis, executive secretary of the Adhesives Manufacturers Association has stated, "Inclusion of the term 'chemical additive' within the meaning of the term 'food' opens a Pandora's box of unimaginable consequences because it subjects packaging components to all of the food laws. Laws written in 1938 with food in mind should not be indiscriminately applied to packaging components without careful deliberation."

The Society of the Plastics Industry expressed the various industries' concern over what would happen to small business should the FDA bill be passed. They'll be hit hardest by the added costs of "licensing," and, as a result, technology will be retarded.

Are pesticides 'additives'?

Also under consideration by the Health and Science subcommittee is a bill (H.R. 9521) to amend the definition of "chemical preservative" — so as not to include "any pesticide chemicals."

Introduction of this legislation is based on FDA's recent interpretation of Section 403 (k) of the Food, Drug and Cosmetic Act which states that a food bearing or containing a "chemical preservative" must be labeled as such — and FDA interprets this requirement as including pesticidal and fungicidal residues. of FDA's recent interpretation? Some wholesalers and retailers have already started to boycott pesticide-treated produce because of the nuisance and extra cost of labeling.

It would seem that pesticide chemical manufacturers should act toward getting H.R. 9521 in the works. Under present FDA interpretation, long-term effects could mean stifling of research on new pesticides as well as shrinking markets.



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Check 5432 opposite last page
CHEMICAL PROCESSING



looking ahead to next month

Quick previews of some
highlights in July
Chemical Processing

Fifth annual feature on corrosion control

Next month **CHEMICAL PROCESSING** will highlight its regular monthly section on Corrosion Control. This will be the fifth successive year for the feature . . . and it looks like it'll run 50 pages.

What to look for: R. C. Schenck, president of The Duriron Company, will tell of the most recent advances made by companies offering corrosion control products or services, and suggest how the chemical process industries can take advantage of these advances.

And again you'll find the popular Corrosion Keys, this year devoted to corrosion properties of lead and the Hastelloy alloys.

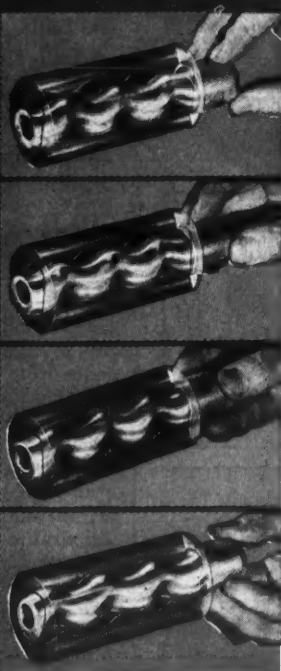
Also — you'll learn how polyethylene-coated conduit solved a severe corrosion problem in a paper mill. Another case-history tells how zirconium performs in valves and other equipment for liquid chlorine service. One more reports on use of corrosion-resistant mortar in a chemical operation where service conditions are rigorous. Condensations of several technical papers on corrosion will be included.

Oil from shale

As time goes on there's sure to be increased activity and interest in shale oil — if for no other reason than the fact that shale reserves in Colorado and Wyoming contain five times as much crude as the rest of the proved petroleum reserves of the entire Free World. But the whole project is dependent on development of an economical process for extraction.

For more than a year now, Union Oil Company of California has been operating an \$8-million pilot extraction unit in the heart of the Colorado

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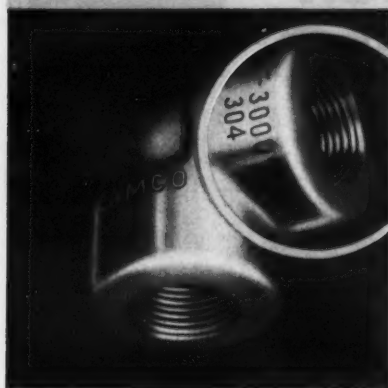
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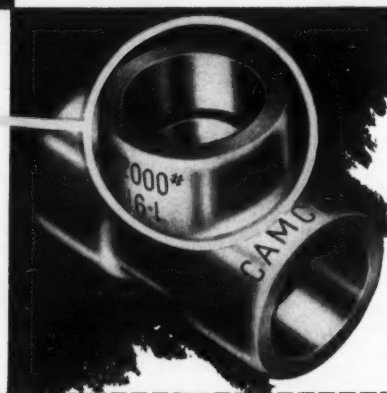
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NEXT MONTH

reserves. And they've learned a lot of secrets about developing these reserves.

CHEMICAL PROCESSING interviewed Fred Hartley, Union Oil v-p in charge of this vast research activity, who in next month's issue gives us an up-to-date report on its progress.

Waste handling at Callery

Effluent waste disposal problems at Callery Chemical's plant outside Pittsburgh were complicated by a number of situations. First of all, they had no access to a large body of water or river. Also, the composition and quantity of waste varied greatly. The trick was to concentrate them for subsequent disposal by sale, deep-well injection, or dilution in large bodies of water elsewhere.

This has been accomplished by use of versatile waste treatment system including a packaged submerged combustion unit. Latter concentrates materials so that it can be drummed for subsequent disposal. Unit can vaporize about 1900 pounds of water hourly.

You'll find a description of the operation in an article by associate editor Ted Meinhold and Callery's project engineer, Edward Arnold, in July's New Solutions section.

Reaching optimum point in automatic control

"This operation won't justify automatic controls", was management's decision at Union Sugar Division of Consolidated Foods regarding a sugar-liquor filtering process. Consequently, when it came time to redesign a filtering system, management settled for a semi-automatic operation with one man at the controls.

In next month's Process Instrumentation and Laboratory Apparatus section, plant superintendent Allan Woods tells how the company came up with a system that wasn't over-engineered, had a lower initial cost, and is simple enough for a "green" man to operate.

Excerpts From The Chemical Hall of FAME



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CHEMICAL PROCESSING

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Thoughts on creativity

Dear Sir:

I have read again and again, with ever-renewed interest, Dr. G. J. Martin's remarkable appraisal "Creativity and Survival," recently published in this journal (CHEMICAL PROCESSING, December 1957, Page 27).

I hope you will allow a simple citizen of the oldest European democracy to set down some of the thoughts evoked by reading Dr. Martin's paper.

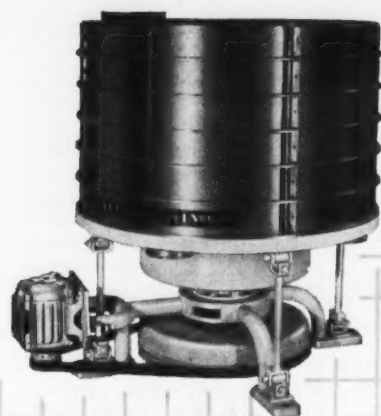
Unconsciously perhaps, Dr. Martin has followed Nelson's famous axiom before the battle of Trafalgar. What in fact is the matter? By looking at the problem of creative thought in a truly realistic light — however harsh it be — Dr. Martin has provided an example of the vitality, far-sightedness and moral courage of the American people.

It does indeed seem that, as the author says, fundamental new contributions to medical and scientific knowledge in recent decades are not of American but of European origin. Why is this?

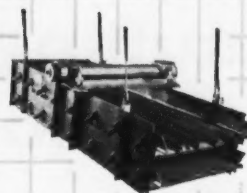
It is noteworthy — and this applies to Switzerland as a whole — that the most eminent scientists (engineers, chemists, biologists, mathematicians, technicians) generally come from the section "humanities-classes."

This is easily explained, for this "art of training minds" imparts a culture which is neither learning nor education, but a happy combination of both. This type of culture is not just learning since it is not motivated by practical benefits but is rather art for art's sake, an end in itself and a chosen life's work. Thus the statement of Port-Royal "sound thinking is of infinitely more value than all speculative knowledge" still holds good today.

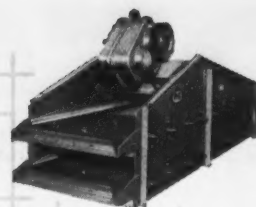
One must realize that the strength of the West lies in the value of this teaching which opens up every avenue, broadens our vistas and makes it possible to acquire the "mental versatility" nec-



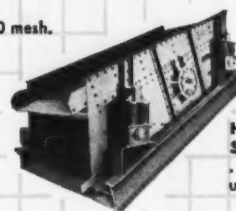
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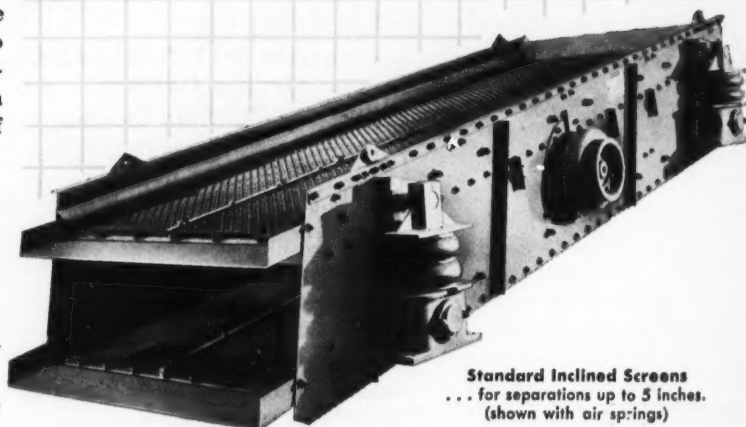
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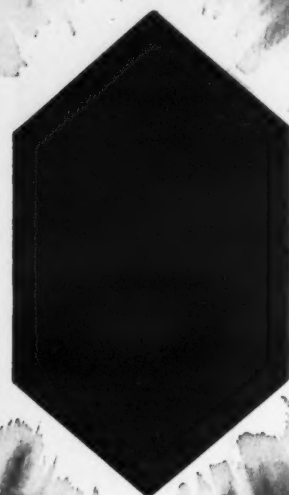


A-5583

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Check 5437 opposite last page

LETTERS

essary for the emergence of creative thought.

A Swiss industrialist recently declared: "The elite forms the periscope of the social body through which the latter receives its impetus and marching orders." The tragedy of the West today is that it has disintegrated the individual by dissociating the spiritual and temporal spheres.

Whatever their origin, and however brilliant they are, the specialists we train will fail to make their mark if they lack the mental unity, the inner harmony which alone make an integrated personality.

If our Western and "bourgeois" world is to survive, it must have a first-class elite, carefully picked leaders conscious of their intellectual and moral responsibilities to those they govern.

It is under the aegis of Saint Exupéry who wrote in "Terre des Hommes", "One sees clearly only with the heart, the essential is hidden to the eyes," that I dedicate this message in all friendship to my American friends known and unknown.

JEAN-CLAUDE BOSSET
Chem. Bactériologist EGC
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La Tour de Peilz
Switzerland

Equipment leasing

Dear Sir:

There is no doubt that Mr. Heins is correct in saying that the trend toward equipment leasing (May 1958, page 29) is growing at the present time. This is borne out most definitely by my own past and current experience.

Although Mr. Heins presents a fair case for equipment leasing, I am inclined to think that he has rested too much of his case on dollar figures for specific or semi-specific situations, when, in fact, the actual market for leased chemical equipment is of infinite variation. And leasing has additional tangible and intangible advantages not covered by Mr. Hein's article.

Leasing can also have some

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CHEMICAL PROCESSING

LETTERS

disadvantages not mentioned by Mr. Heins, but these usually result from ignorance of one or both parties to the lease as to their respective responsibilities.

After considerable study and some experience, I strongly believe that leasing provides an alternate method for the chemical producer to acquire and finance needed production equipment, and obtain at the same time tangible financial and other advantages not available through more historically familiar purchasing methods.

In these days of so-called "tough sell" I feel that the supplier of chemical production equipment, whether a used equipment dealer or basic equipment manufacturer, must adjust his operations to make this modern marketing tool available to the chemical industry.

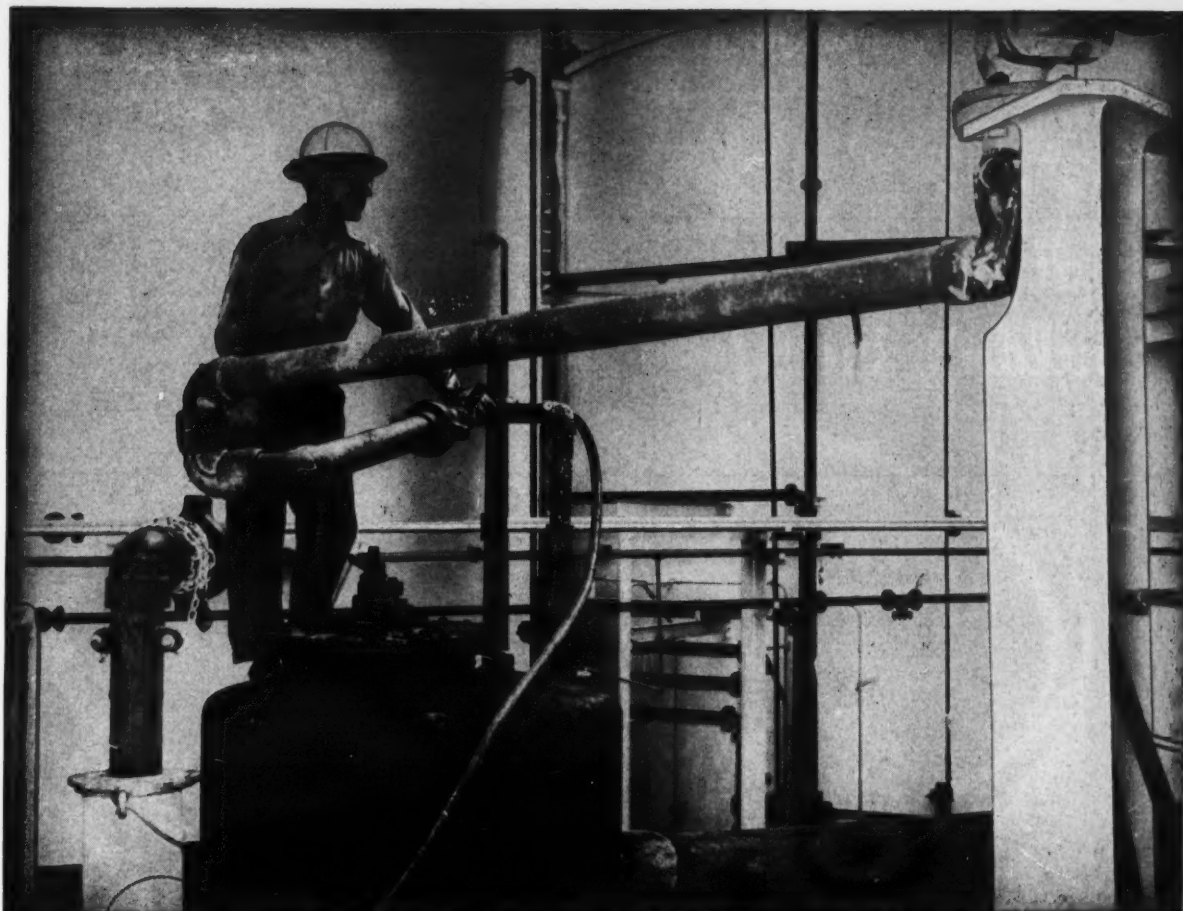
There are some leasing companies who operate exclusively on a rental or lease basis, but they are comparatively few at present.

Certainly, leasing is a growing trend and growing rapidly, but I do not feel that it has reached a volume of major significance in relation to total chemical equipment purchased. It was not even my impression that the industry is actually making an extensive use of leasing as Mr. Heins' article seems to indicate.

However, the relative volume of purchased equipment to leased equipment in certain other industries, for instance petroleum or food products, is considerably higher than in the chemical industry, although generally the same conditions apply.

Although this is a subject for considerable discussion and specific application, there is no question that much of the chemical industry today has changed or is changing its thinking of the basic nature of chemical equipment that it needs. Even ten years ago there was little thought of purchasing anything but "battle-ship" quality equipment to last many years with minimum replacement parts requirements.

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the mix
that money
couldn't buy



LETTERS

changes of the past ten years in chemical technology have initiated a trend toward equipment that is adequate rather than superior. These changes also provide an atmosphere conducive to the consideration of leased equipment on the part of the chemical manufacturer.

Mr. Heins mentions at some length detailed financial figures to exemplify the advantages of leasing as well as to show a few of the areas where there are disadvantages. I have found that pure financial statements tend to obscure a feature of leasing that is equally intriguing to the chemical producer and chemical equipment supplier; mainly, the infinite variety of terms that seem to be made available through lease contracts.

Another factor that should be considered is that it offers an opportunity to the chemical producer to free himself of certain service requirements and spare parts inventories, to provide himself with comparatively inexpensive but highly effective research and development equipment on a semi-works or works scale, and to conduct many marginal operations on a pay-as-you-go basis.

Possibly my rather strong endorsement of the principles of leasing equipment to the chemical industry sounds peculiar coming from one representing an organization that manufactures and supplies equipment to the chemical industry.

However, I feel that leasing is a modern concept that has taken a strong and successful root in many industrial fields and which has only just begun to draw the attention of the chemical industry.

It can be a financially sound and physically attractive method of doing business. I, like Mr. Heins, see no reason why the chemical industry should not adopt and adapt it to the industry's benefit.

T. T. MEEHAN
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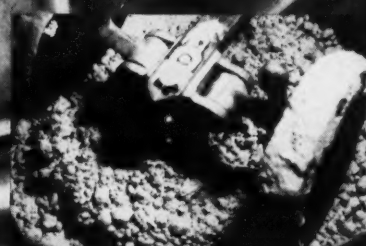
This is why we say—if the Mix-Muller is right for your product . . . money couldn't buy you a better, and more economical blend of materials. Why not write for a copy of: "Mulling In the Chemical Process Industry".

SEE PAGES 1263-1266 CEC FOR MORE DETAILS

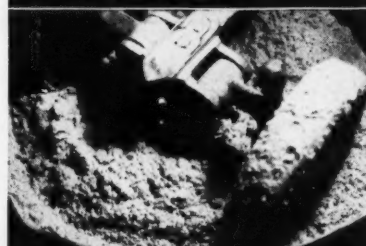
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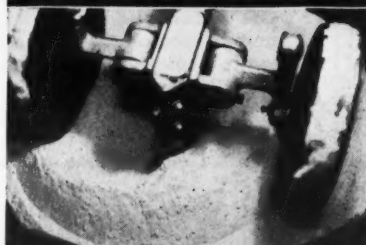
P-358



GOING: Mix is wetted. Dispersion of resin-alcohol begins as lumps form.



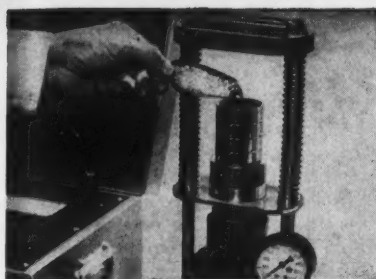
GOING: Smearing, spatulate action breaks up lumps as mulling action disperses moisture.



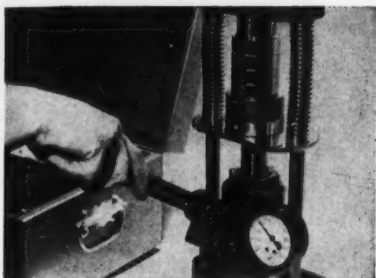
GONE: Agglomerates almost gone as blending nears completion. Mix is homogeneous, thorough, and quickly achieved.



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Moisture Register Co., Dept. CPC
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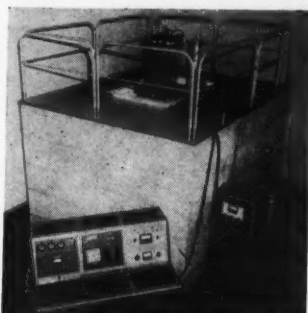


nuclear notes

**Significant news about
atomic energy**

U. S. portable reactor at Brussels fair

Portable pool-type, research and training reactor is being displayed by AEC at Brussels fair. The first portable unit of its kind, it is capable of operating at 100 watts continuously and one kilowatt inter-



Reactor uses only 780 grams of U-235

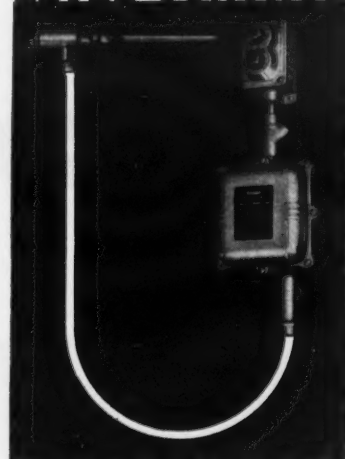
mittently. It requires only 780 grams of contained U-235, the lowest critical mass in a pool reactor. Unit is homogeneous fuel, polyethylene-moderated type. Aerojet-General Nuclear, San Ramon, California, constructed it.

Radioactive cesium waste recovery

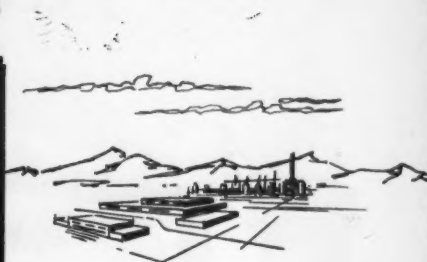
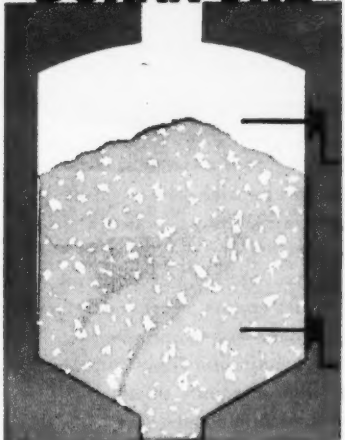
Efforts to recover radioactive cesium from vast quantities of chemical waste stored at AEC's Hanford plant near Richland, Wash., are being studied by General Electric Company. The studies, undertaken at the request of the AEC, are aimed at estimating the potential market for fission products as industrial irradiation sources.

An installation capable of producing large amounts of cesium-137 could be accomplished by converting existing but unused facilities at a capital cost of about one and one-half million dollars. At present, AEC is marketing cesium at \$10 per curie. However, large scale recovery would substantially reduce the cost.

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GRANULAR
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LIKE
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At the sprawling U. S. Borax & Chemical Corp. refinery in Boron, Calif. Robertshaw-Fulton Tektor Level Controls keep watchful, automated eyes on the crude borax ore as it moves from the pit bottom into the refinery's giant thickeners, crystallizers and dryers to eventually emerge as derivatives used in heat-resistant glass, gasoline and in rocket fuel research.

Installed as high and low level controls in each of the huge receiving tanks, the R-F Tektors indicate automatically when the ore has reached a predetermined level. A built-in relay-actuated switch operates motor-driven valves and pumps to switch the feed from one tank to another.

Installed more than six months ago, U. S. Borax engineers report the instruments have been operating with extreme accuracy and have required no maintenance.

Thousands of Tektor Level Controls are now in use throughout the world, operating in various liquids, powders, granular and bulky materials and under almost all conditions of temperature, pressure or vacuum. The unit is available in four different types of enclosures including an approved explosion-proof type for hazardous locations. For further information write for Technical Bulletin F-101-4.

Other Tektor applications: Liquids, including water, acids, alkalies, oils and viscous liquids; powdered materials and bulky solids.

AERONAUTICAL AND INSTRUMENT DIVISION

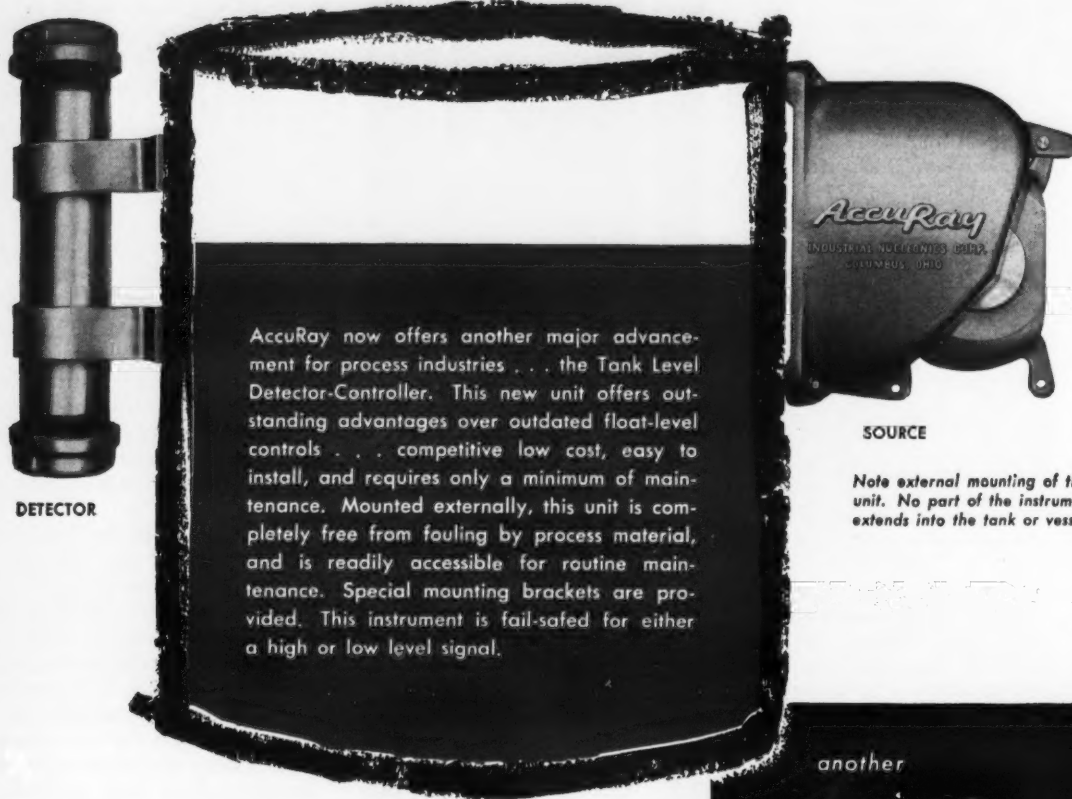
Robertshaw-Fulton CONTROLS COMPANY

SANTA ANA FREEWAY AT EUCLID AVENUE • ANAHEIM, CALIFORNIA

Check 5442 opposite last page

AccuRay.

TANK LEVEL DETECTOR- CONTROLLER



DETECTOR

AccuRay now offers another major advancement for process industries . . . the Tank Level Detector-Controller. This new unit offers outstanding advantages over outdated float-level controls . . . competitive low cost, easy to install, and requires only a minimum of maintenance. Mounted externally, this unit is completely free from fouling by process material, and is readily accessible for routine maintenance. Special mounting brackets are provided. This instrument is fail-*safe*d for either a high or low level signal.

SOURCE

Note external mounting of the unit. No part of the instrument extends into the tank or vessel.

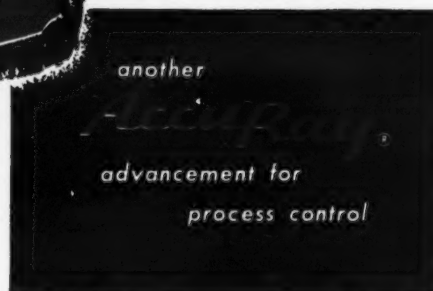
The AccuRay Tank Level Detector-Controller can be used in two ways. It can be installed horizontally to provide a relay closure signal when the level rises above or falls below the level of the detector; or it can be installed vertically so that both a high level and a low level signal can be provided from one instrument. Accuracies can be maintained to plus or minus $\frac{1}{16}$ ". The radiation source is installed either opposite the detector on the tank, or across a chord of the tank. The design of the source housing provides more than adequate shielding. Design of the instrument is in accordance with accepted standards for both explosion-proof and weatherproof operation.

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Detector-Controllers.

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Application _____

NUCLEAR NOTES

Argonne breeder reactor will cost \$29 million

Argonne National Laboratory is proceeding with the construction of its \$29-million breeder reactor at Idaho Falls, Idaho. Scheduled for completion by 1960, the EBR-2 will



Breeder reactor will produce
17,500 kw electricity

have a thermal power rating of 62,500 kw. Net electrical output is 17,500 kw. The facility will include complete fuel processing and fabrication units in addition to reactor, heat transfer systems, and steam-electric plant.

Zirconium tube by the mile

Forty-four miles of zirconium tube are being processed by Mallory-Sharon Metals Corporation of Niles, Ohio, in conjunction with Bridgeport Brass Co., Bridgeport, Conn., for use in Commonwealth Edison Company's Dresden Nuclear Power Station near Chicago, Illinois. The tube is made of reactor-grade zirconium, 9/16" diam and 1/32" wall thickness.

Fuel conversion charges specified by AEC

AEC has established prices for converting purified uranium and plutonium nitrate salts into uranium hexafluoride (UF₆) and plutonium metal. They are:

- 1) Converting low-enrichment uranyl nitrate (5% or less by weight of U-235 in total uranium) into UF₆ — \$5.60/kg of contained uranium.
- 2) High-enrichment uranyl nitrate (more than 5% U-235) into UF₆ — \$32/kg of contained uranium.
- 3) Purified plutoni-

NUCLEAR NOTES

metal — \$1.50/gm of contained plutonium.

The above is in line with AEC policy to continue to provide fuel reprocessing services until private commercial facilities have been set up to do the work at reasonable prices.

Fuel reprocessing is being conducted with industry under individually negotiated contracts. The conversion charges are in addition to the basic contract price. They cover cost of converting end product from fuel reprocessing system into useable forms for which Commission prices have been established.

Integrally finned tube for gas-cooled reactors

Availability of integrally finned tube in low carbon steel and "Magneox" (magnesium-beryllium alloy) for application in gas-cooled nuclear power plants has been announced by U.S. manufacturer. As a result of British success, gas-cooled reactors are receiving new attention in this country.

The integrally finned tube greatly increases efficiency of heat exchange between gas and water. According to the British, its use is a major reason for their success with the gas-cooled reactor.

(Integrally finned tube is produced by Wolverine Tube Div., Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Mich.)

Check 5444 opposite last page.

Small power reactor prospects not good

According to a paper by Leonard F. C. Reichle, nuclear engineering director, Ebasco Services, Inc., prospects are not good for small power reactor units to become competitive in an electric utility system in the U.S. "Small reactor units could be feasible economically in electric utility systems only if they could be used competitively as base-load, standby or temporary

To page 24



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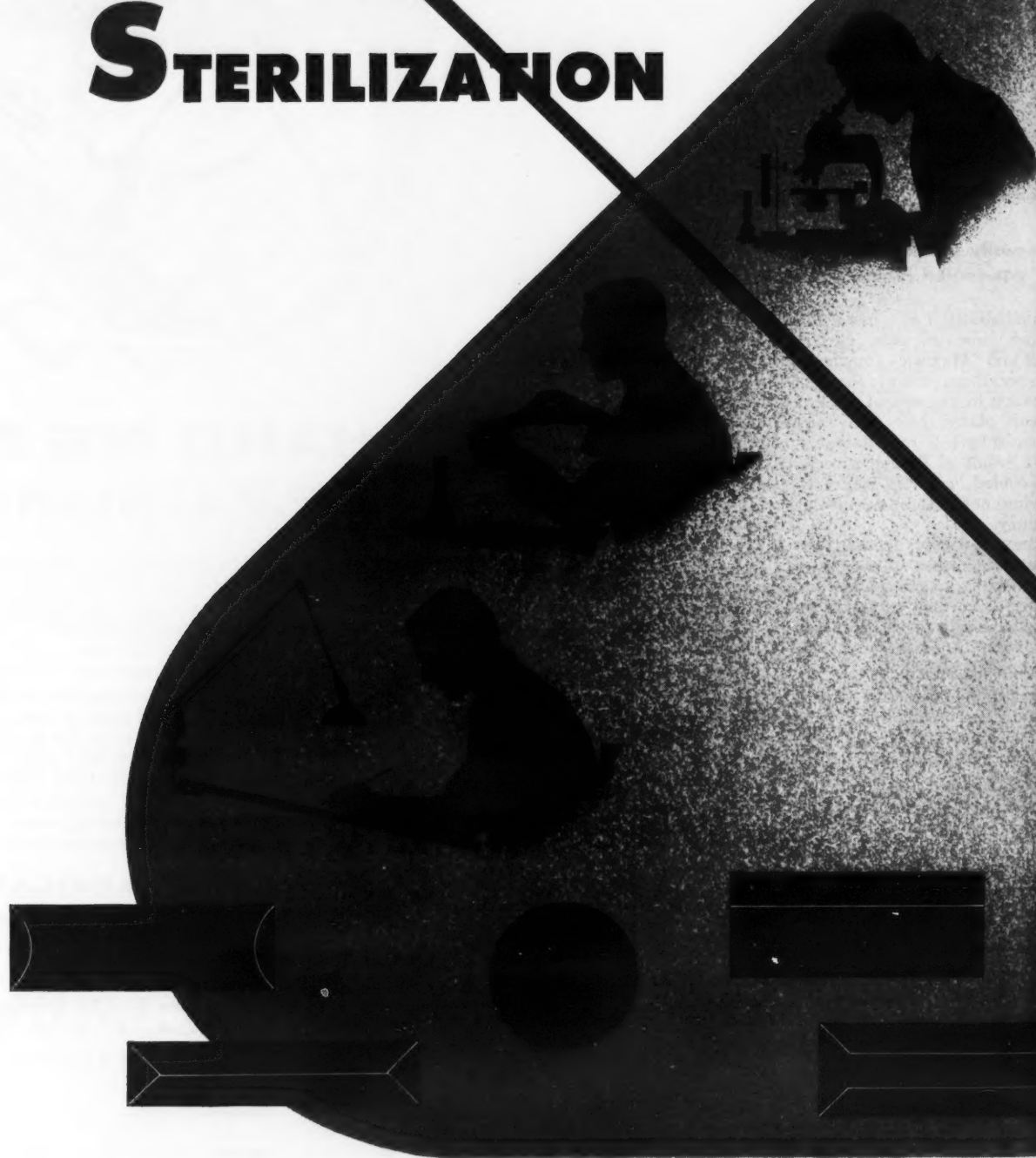
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Address _____ City _____ State _____

- 1 Machining Backing Rings for Butt Welds
- 2 Dimensioning Welded Assemblies
- 3 Linear Tolerances, Bending Radii
- 4 Shop Hydrostatic Testing
- 5 Cleaning Fabricated Piping
- 6 Built-up Weld Metal Bosses
- 7 Welded Nozzles—Spacing
- 8 Preheat-Postheat Before, After Welding
- 9 Arc-Welding Dissimilar Ferritic Steels
- 10 Stress Relieving Practices

Check 5445 opposite last page

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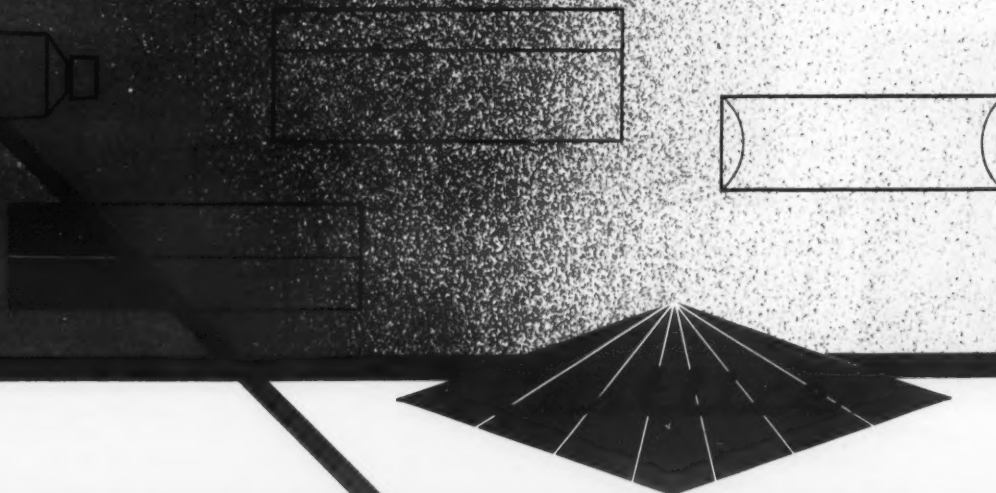
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For more information on product at left, specify 5446 see information request blank opposite last page.



Where lead gives useful corrosion control in liquid Sulphur Dioxide process vessels and piping

Hot SO₂ vapors and other oxidation products present in liquid SO₂ processing are "murder on metal." Even that old corrosive marauder, H₂SO₄, gets into the act.

As a result, *lead* practically lives with these acids and gases throughout the SO₂ process. In fact, the flow chart at the right is almost a continuous flow of *lead* applications. For ducts. For piping. For sheet lead linings in the larger units like the scrubbers and strippers. It is used with steel, with wood, with copper and, in some cases, with concrete. The result is low maintenance cost, facility of repair and consequent freedom from costly production stoppages.

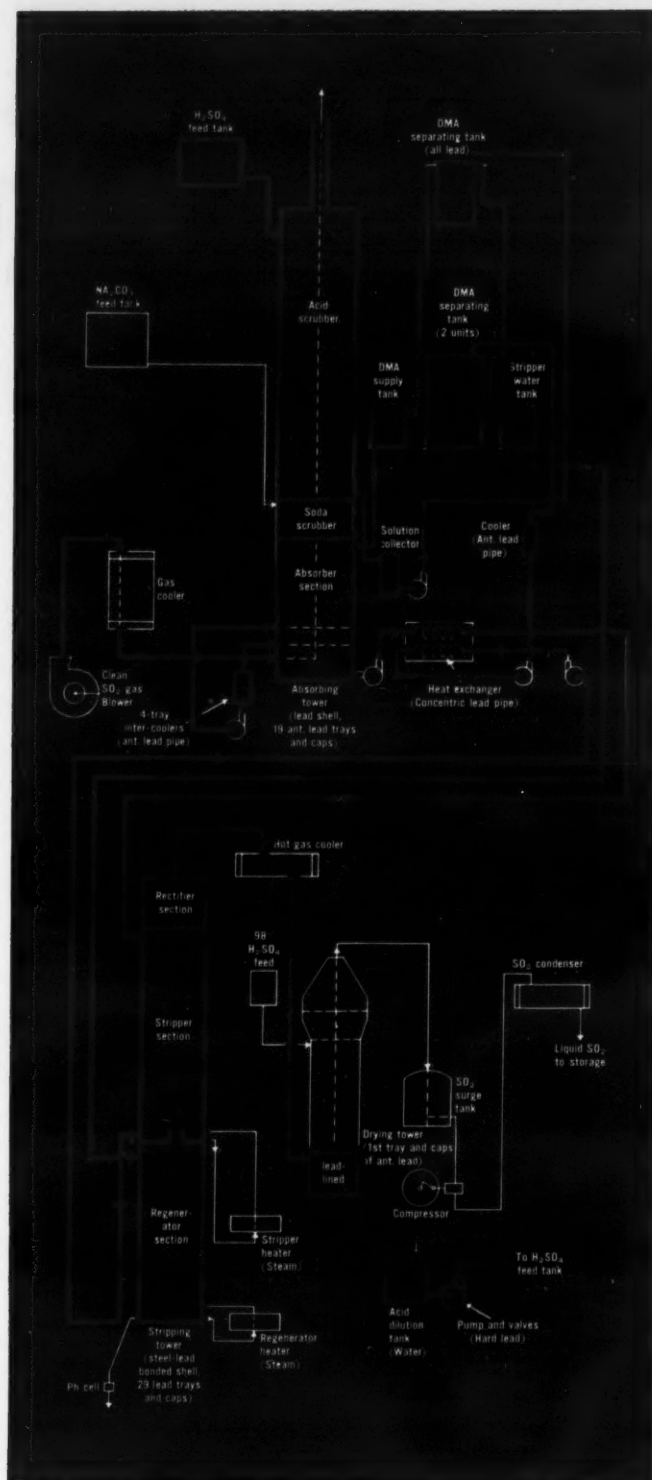
If your process involves corrosive chemicals, look to *lead* for long life, low maintenance and minimum loss of production due to down-time.

When you think of Lead ...think of National Lead



National Lead has the experience to get *lead* and steel together in a *bond* that defies severe pressure and temperature changes, vibration and creep. That's been proved not only in regular production "stock" items such as piping and valves but also in specially designed, complex lead

process and storage equipment. If you are enlarging or modernizing your processing facilities, now's a good time to get the facts about lead-lined equipment. Contact National Lead Company, Lead Lined Products, 111 Broadway, New York 6, New York.



NUCLEAR NOTES

From page 21
capacity." He presented his paper at the Atomic Energy Management Conference in Chicago.

"In foreign countries, where fuel costs are generally high and unit sizes smaller than in the U.S., the small nuclear plant has a better chance of breaking into the market," says Reichle.

All-aqueous approach to fuel reprocessing

The all-aqueous approach to reprocessing of nuclear fuel will probably predominate over other methods for at least the next several years, according to J. W. Ullman, Chemical Technology Branch, Oak Ridge National Laboratory. Speaking at the Atomic Energy Management Conference in Chicago, he said that the advantages of the all-aqueous method are that it involves familiar techniques and that existing plants can be readily modified to use it.

EBWR power level more than tripled

The Experimental Boiling Water Reactor (EBWR) at Argonne National Laboratory of the AEC, Lemont, Ill., has successfully operated at a power level of 62,000 kw. This is more than triple the original design operating level of 20,000 kw. Experiments in December 1957, produced 50,000 kw of heat. Both levels were achieved without any change in the number of nuclear fuel elements within core of reactor.

AEC discontinues irradiation service

Gamma irradiation service has been discontinued for the public by the AEC. There are now 16 private organizations providing this service. AEC policy is to furnish materials and services only when they are not reasonably available commercially.

Check 5447 opposite last page

THAT'S INTERESTING

Shock photos

Pictures of the shock wave produced by things as large as jet planes are possible with new photo technique in daylight. Up to now process was confined to small-size subject matter and required costly equipment.

A suggested way to set up test would be to use following plan: Jet plane flies between screen fabricated from Scotchlite reflective sheet on ground and a helicopter with camera having a high-speed lamp held near lens.
(Industrial Bulletin, Arthur D. Little, Inc.)

Valuable scrap

There is money to be made from old X-ray film. Handy & Harman, New York, will buy X-ray films which are used or outdated on a per-pound basis or process it as a refined lot basis. In the latter case customer gets a complete assay value of silver recovered, less service charge.

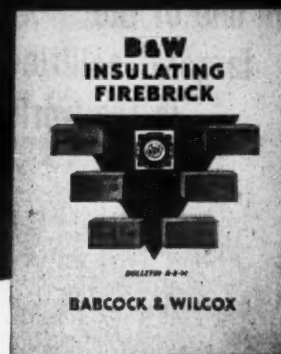
For more information on product at right, specify 5448 see information request blank opposite last page.



Why B&W IFB for Oil Heater Linings

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- Lightest weight
- Simplified construction
- High hot load strength
- Lower conductivity
- Lower heat storage
- Better process control



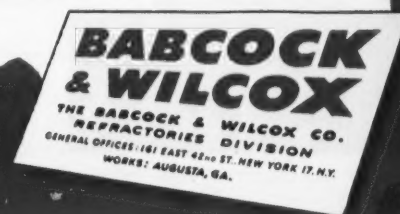
The light weight of B&W Insulating Firebrick provides savings in capital investment in several different ways. The light weight of B&W IFB permits thinner wall constructions of equivalent insulating value. These thinner, lighter walls mean real savings in structural steel and concrete. Construction is further simplified because B&W IFB's high hot load strength makes possible higher unsupported walls without deformation at furnace operating temperatures. In addition B&W IFB can

be cut and shaped with ordinary wood working tools, simplifying field installation.

The light weight of B&W Insulating Firebrick also provides the greatest insulation. Thus, they save more fuel.

Light weight also means lower heat storage. B&W IFB protect you against burn-out of expensive alloy tubing in the event of forced shutdown. B&W IFB respond faster to changes in firing rate, too, assuring you of more positive process control.

**Write for Bulletin R-2-H giving more data on B&W Insulating Firebrick.*

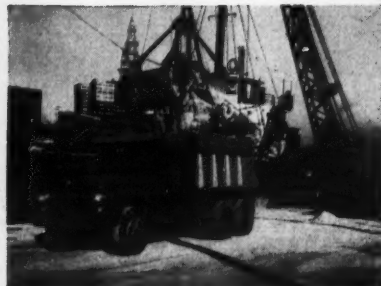


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Mortars • B&W Silicon Carbide • B&W Ramming Mixes • B&W Kaowool

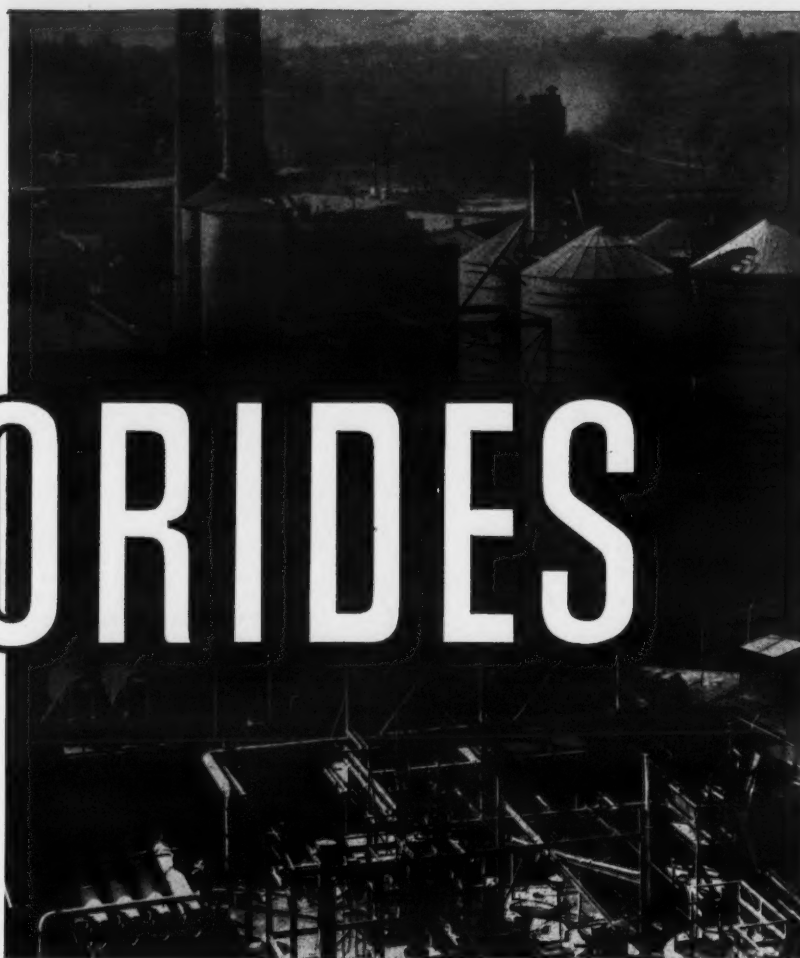
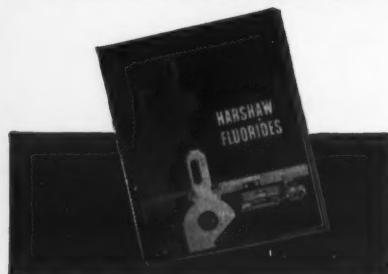
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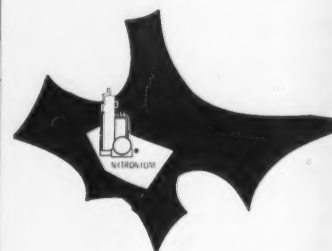
Ammonium Bifluoride	Hydrofluoric Acid Aqueous
Ammonium Fluoborate	Hydrofluosilicic Acid
Antimony Trifluoride Sublimed	Lead Fluoborate
Barium Fluoride	Metallic Fluoborates
Bismuth Fluoride	Nickel Fluoborate
Boron Trifluoride	Potassium Bifluoride
Boron Trifluoride Complexes	Potassium Chromium Fluoride
Cadmium Fluoborate	Potassium Fluoborate
Chromium Fluoride	Potassium Fluoride
Copper Fluoborate	Potassium Titanium Fluoride
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HOW



ROBERT L. JAMES, a chemical engineer, has been engaged in market research with Arthur D. Little's Industrial Economics Group since 1950. He has conducted extensive market studies on synthetic rubber raw materials and petrochemicals, making significant contributions to many ADL reports on these subjects. Prior to 1950, Mr. James worked on process design and process studies involving petrochemicals, fermentation, and petroleum products.

- What's your market share as limited by freight equalization costs?
- Should you expand in the face of industry overcapacity?
- How do you measure-up against your competitor — now and in the future?
- Where should you locate your new plant so its products will have a competitive edge?

All these questions — and more — must be answered in determining . . .

V MUCH OF THE MARKET CAN I GET?

ROBERT L. JAMES
Arthur D. Little, Inc.
Cambridge, Mass.

As competition in the chemical and allied industries grows more intense, the question of market share is a big one for companies planning to expand. After World War II and during the Korean emergency, producers were interested in how much the demand exceeded supply, and how they could get their share of this delightful unbalance. Behind the impetus for building plants was a well-founded optimism concerning potential growth in chemical and allied markets. The general result of this optimistic expansion has been overcapacity. In scarcely any chemical commodity market today does the demand exceed the maximum supply.

How then can a chemical company expand while industry supplies are ample and likely to continue so? Research is not creating new products rapidly enough to satisfy the growth desires of business organizations. Consequently, companies are being forced to increase present sales of established products. How is this being done? By market research into market shares.

The question of market share for established products cannot be answered with engineering precision because of many intangibles involved. An estimate

depends upon: 1) size of regional market available to producing site, and its possible growth or decline; 2) how well the producer is equipped to compete in a buyer-controlled market; and 3) competitive strength of other organizations serving this market.

An estimated numerical index can be used to compare competitive strength of a company with that of its market competitors. The hypothetical example below illustrates this method. This example concerns ammonia, but the method applies also to other commodities, such as asphalt, sulfuric acid, lime, phosphate materials, and cement—products for which market territory is determined largely by the producer's freight equalization costs. With the rare exceptions of isolated markets, competitive producers of commodities must equalize their freight costs with those of the nearest supplier.

Nitronium, Inc.

Nitronium, Inc., to name this hypothetical plant, is interested in constructing an ammonia plant at a specific location in the South, and wishes to determine plant size, basing it on the probable market that can be captured. Steps used in estimating sales volume are: 1) definition of marketing territory; 2) determination of synthetic nitrogen consumption within this territory; and 3) estimation of company's market portion by assessing sales

ability in relation to that of competitors.

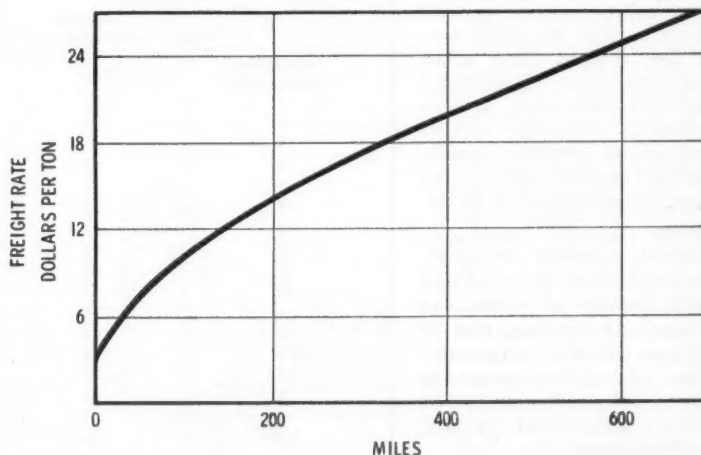
Definition of Marketing Territory

Process-economics calculations on ammonia plants of the probable size range of this fictitious company indicate that more than \$10 per ton of the ammonia shipping costs cannot be absorbed. These calculations are based on incremental production volume and anticipated price of \$70-75 per ton. The outer boundary of the marketing territory is established where additional freight costs would bring return on investment below a desired level.

Boundary of the \$10-freight-

equalization zone is approximated by the curve in which cost of shipping ammonia is plotted against straight-line distance. A more accurate boundary might have been established by calculating exact freight costs from the producing site to each consuming point, but this process is time-consuming. Experience has shown that when enough data have been collected on a straight-line distance basis, the costs are within 10% of actual.

The \$10-freight-equalization boundary, based on freight costs from surrounding competitive plants, is shown on the freight equalization map. These freight contours, which are portions of



Freight rate for ammonia from Nitronium's plant versus straight-line distance in miles to purchaser's plant. While relationship is not usually exact (as is shown), this type curve is sufficiently accurate for most calculations

How Much of A Market? *From preceding page*

intersecting hyperbolas, are loci of points at which difference in shipping costs between Nitronium and its nearest competitors is constant. Freight-equalization lines have been placed at \$2.50 intervals so that the producer's total freight cost can be later determined from the distribution of company sales within the territory.

The hypothetical marketing territory surrounding the contemplated production site covers five states completely, involves large portions of four states, and includes minor areas of seven states — a total of 16 states.

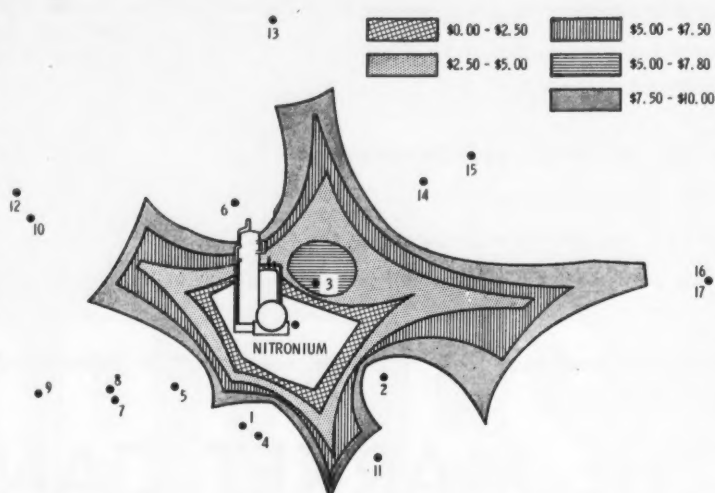
Determination of Total Market

Nitrogen sales are classified into two broad categories — agricultural and industrial — of which the agricultural uses are the most important. Possible foreign markets are eliminated because no ocean outlets are available to the company in this example.

Current agricultural consumption of nitrogen within the marketing territory can easily be determined from U.S. Department of Agriculture figures, which give the amount and form used in each state. Two simplifying assumptions are made: 1) nitrogen used by the farmers is being purchased from local fertilizer dealers; and 2) consumption in fractions of the marketing territory can be apportioned according to percent of area covered. In some states, particularly in the Midwest, neither assumption may be valid, because considerable quantities of mixed fertilizer are shipped from other regions, and often agricultural activity is concentrated in certain counties. However, market surveys among fertilizer organizations and agronomists in the southern states support both assumptions.

Industrial nitrogen consumption is smaller and more difficult to assess because of widespread small uses. An estimate can be made from market information on the consuming industries, such as industrial explosives, synthetic fibers, metal treating, and refrigeration.

These combined markets consumed about 890,000 tons of nitrogen in 1955, and are expected



Freight-equalization map for hypothetical company called Nitronium, Inc. This sketch, when placed over a map of the United States, outlines Nitronium's marketing areas as compared with 17 competitors. Similar maps may be made for any commodity whose sales depend upon freight equalization costs. Nitronium's area of natural freight advantage lies within polygon at left center. "Island" containing competitor 3 has been omitted from discussion because it has little effect on overall results

to use 1,060,000 tons in 1960. These volumes represent the total quantity — present and projected — to be apportioned among competitive suppliers according to their marketing strength. Distribution within the freight-equalization zones described is calculated at 2% within Nitronium's preferred marketing zone, 7% in the \$0.00-2.50 zone, 17% in the \$2.50-5.00

zone, 36% in the \$5.00-7.50 zone, and 38% in the \$7.50-10.00 zone.

Apportioning Total Market

Mathematical distribution of total market can be mechanical. But, apportioning of market volume among established and prospective producers introduces the additional factor of judgment, and accuracy of the estimate

rests on personal insight into the diverse marketing factors controlling competition in the field. Preferably, this knowledge should derive from a team that has developed extensive background from discussions with consumers on suppliers' sales practices.

Suppliers enjoy different acceptances because of their technical service, pricing policies, ability to provide rapid delivery, concentration of sales effort, quality control, product allocation during shortages, and degree of competition with their customers. In most long-term business operations, many temporary factors may encourage the consumers to favor or disfavor individual suppliers, and these temporary elements should be disregarded when the marketing strength of an organization is being judged.

In the case of Nitronium, 17 competitors are selling nitrogen products in the total marketing area. Marketing strength of each company, including Nitronium, is rated on an index system based on sales ability, market entrenchment, proximity to marketing area, and plant capacity, as shown in the table below.

A maximum rating of three is used for each index except sales ability, which has a maximum value of four. Relative values of these factors will of course vary with product, although usually sales ability, which is the most difficult to assess, is of particular importance. In the case of asphalt, for example, proximity to market is more significant because shipments are made on very short notice (depending on weather conditions), and the supplier enjoys a competitive advantage when asphalt can be delivered while still retaining process heat.

The sales ability of competitive companies cannot be assessed directly, not because such an approach is too time-consuming, but because organizations have no incentive to assist, or even allow, such examinations. However, information gathered from company reports on total sales cost, number of sales personnel, and number of sales offices will offer clues to intensity of sales coverage.

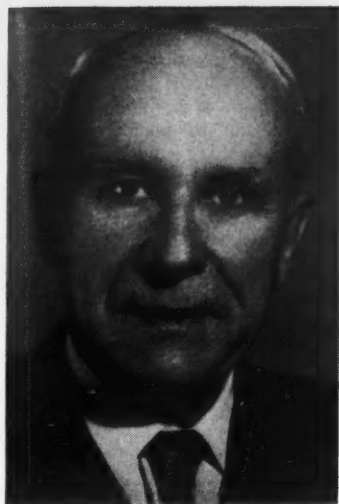
To page 72

RATINGS OF COMPANIES IN MARKETING TERRITORY

	Sales	Market Entrenchment*	Proximity	Plant Capacity	Total
Nitronium	3	1	3	2	9
Competitor					
1	4	2	2	3	11
2	4	3	2	2	11
3	3	3	2	2	10
4	4	2	1	2	9
5	3	3	1	2	9
6	2	2	1	2	7
7	2	2	1	2	7
8	1	3	2	1	7
9	1	2	2	1	6
10	1	3	1	1	6
11	1	3	1	1	6
12	2	1	1	2	6
13	2	1	1	1	5
14	3	1	0	1	5
15	2	1	0	1	4
16	1	1	1	1	4
17	1	1	0	1	3

*After one year of operation by Nitronium.

124



William J. Kroll, consulting electrochemist-metallurgist and developer of the basic Kroll process used for producing metallic titanium and zirconium, was chosen to receive the 1958 Perkin Medal of the American Section of the Society of Chemical Industry.

Dr. Kroll has made outstanding contributions to many branches of non-ferrous metallurgy.

Present investments in titanium industries, counted in hundreds of millions of dollars, are based on the fundamental process developed by Dr. Kroll, working alone with limited means and without encouragement from industry. Other accomplishments of this remarkable man include processes of vacuum metallurgy, production of extremely pure metals, and development of many important non-ferrous alloys. He is credited with the discovery that germanium crystals can be used as radio detectors, basic to the present wide development of transistors; and he devised successful commercial processes for producing metallic beryllium, and for debismuthizing lead with calcium. Dr. Kroll was born in Esch, Luxembourg, in 1889 and graduated from the Technische Hochschule, Charlottenburg, Germany, in 1917 with the degree of Doctor of Engineering. He operated his own laboratory in Luxembourg from 1923 until 1940, when he came to this country ahead of the Nazi invasion.

He served as consultant for the Union Carbide Research Laboratories in Niagara Falls, 1940-1945, and for the U. S. Bureau of Mines at Albany, Oregon, 1945-1950. Since 1950, he has operated his own consulting laboratory at Corvallis, Oregon. Dr. Kroll became an American citizen in 1952.

Besides the Perkin Medal his honors include: Francis J. Clamer Medal of the Franklin Institute; James Douglas Medal, A.I.M.E.; Albert J. Sauveur Award, American Society for Metals; Heyn Award, Deutsche Gesellschaft für Metallkunde; Honorary Doctorate, University of Grenoble, France; and Honorary Doctorate, Oregon State College.

An address given by Dr. W. J. Kroll upon receiving the 1958 Perkin Medal Award caused considerable reaction in scientific and educational circles, and excerpts were widely quoted. The editors of CHEMICAL PROCESSING felt that an elaboration of Dr. Kroll's remarks would be of great interest to the readers. In the following article, Dr. Kroll enlarges upon his comments made at the Perkin Medal Award dinner, and expresses his viewpoints on the merits of . . .

INDIVIDUAL VS TEAM RESEARCH

W. J. KROLL
Consulting Metallurgist

The formation of inventors and scientists must really start in high school. But the originators of our primary and secondary educational programs have done their utmost to make the student unfit for an inventive or scientific career.

At present, some sputnik-prompted conscience searching is going on among US educators, scientists, politicians, and all thoughtful citizens. Considerable changes, perhaps amounting to a general overhauling of our educational system, are being given serious consideration. (See CHEMICAL PROCESSING, May 1958, page 44.)

Indictment of Schools

A century ago, the first settlers of our continent went into forbidden Indian territory to shoot buffalo, at the risk of their lives, just to get its tongue which they sold for around 25 cents. The descendants of these rugged individualists are now corralled — mentally and creatively.

Accordingly to Dorothy Thompson, "In dealing with youth we are unconsciously leading to a collectivist government-controlled society which is the essence of communism. In collectivist societies, emphasis is always on group activities under government leadership. Everything, including recreation, must be supervised . . . So the public schools (and now most private ones), bent on this neo-democratism, press towards controlling and conditioning children from the cradle to the grave; . . . supervising their play; hiring psychiatrists to overhear intimate conversations in wired

playrooms; and besieging them with questionnaires to be analyzed by social scientists."

This is a formidable indictment of collectivism in our schools, which has made pulp out of the pioneer's progeny. Its purpose is different from the purpose in Russia, where collectivism is practiced compulsively as an ideology and creed of the state. Here we do it deliberately, out of the teachings of psychologists.

Practitioners of psychology hire personnel of corporations, straighten out their public relations, propagandize and persuade buyers by insinuation, and alas, invade our schools, where they prescribe educational methods. These methods aim at creating the "rounded personality" and are staunchly advocated by proponents of so-called "progressive education."

Automatons — Not Useful Scientists

The end result of this system is to achieve equalization and conformism. However, men are born unequal of mind and body, and attempts at keeping down

the bright ones are against nature. Admittedly, if our schools could produce the perfect automations, they could be used for doing repetitious work. We would also have the advantage of exchangeability, as with standardized parts.

But certainly we would not have useful scientific researchers or inventors.

Group education is also fostered by universities, if we believe the speeches of some of our professors. They proclaim that individual accomplishment is a thing of the past and that research will be monopolized in government and corporation laboratories that possess the equipment, libraries, planners, specialized personnel, and finances. Indeed, these are tough odds against the individual, but there is no mention of brains.

Individual Does the Inventing

However, these promoters of institutional research are rather ill-informed about facts. In the book, "The Sources of Invention," there are two lists — one of twentieth-century individual inventors who brought about great advances, and another with the names of famous "team" inventors. The first list is comprised of 33 names, the second has only 21. In the last few years, two-fifths of all American patents have been taken out by individual inventors. And it is noteworthy that only a very few institutional scientists ever received the Nobel Prize.

The odds are even more unfavorable for "team" research if we take into account the importance of an invention or dis-



'Grandsons of rugged individualists are now corralled — fenced-in mentally and creatively.'

INDIVIDUAL VS TEAM RESEARCH

From preceding page

covery for humanity. No organization or government ever will match the performance of the Curies, who brought on the atomic age, or that of Fleming, who blessed humanity with penicillin.

Personality Conflicts

In team research, emphasis must be placed on human re-



'They usually present team as ideal arrangement . . . if selected from 'rounded personalities.' ('Practice shows teams are not run by brotherly love but by hard facts of life'.)

lations. These relations may concern behavior within the group, the mental attitude of individual members — their motivation, their way of thinking — the reaction of the group leader to gifted subordinates, the moral code, and the like. Shall brains or authority decide? Psychologists wisely detour these questions. They usually present the team as an ideal arrangement, based on understanding and mutual help, if selected from "rounded personalities" by way of their questionnaires. Practice shows, however, that even under these conditions, teams are not run by brotherly love but by the hard facts of life.

Such problems of human relations barely exist for the individual inventor, as long as he works by himself. He can concentrate on his inventing since he has no neighbor or boss to interfere with his thoughts or to bother him. He is not going to sit in unending conferences to decide what to decide, and to conform to the conformers.

Like the artist, he cherishes his freedom of expression, and he is usually willing to sacrifice the comforts of life, which a salaried position would offer him, to his fiercely loved liberty. This may lead him to accept poverty. Many inventors work on an empty stomach, at least for some time. This is a symptom of the powerful forces and obsessions that drive him, not

unlike those which make privation acceptable to artists and composers.

Group Conformism Hampers Creativity

Could the team offer him at least some freedom of action? Maybe yes, if he is entrusted with its management, and as long as its aims coincide with his. Lone inventors are difficult to tame, and their bureaucratization is not conducive of superlative performance. On the contrary, good men might become sterile in group work.

The Russians tried their hand at bureaucratic art, directed by a boss who also prescribed the subject. They hoped that associated mediocrities would create masterpieces. The results were awful.

It seems the smaller the group the greater the chances of artistic or scientific creation, especially if it is made up of compensating elements. Research of two scientists who associate freely on a shared subject may be most gratifying because of the absence of compulsion. Here the human element does not throw up the roadblocks so frequently found in research teams put together by potluck or charged with personalities.

How can independence of thought be preserved within a team? As long as the group is small, harmony of thinking can

possibly be established. In such cases an outstanding intellect may be accepted as spiritual authority by the team, in a relationship resembling that of a teacher to his students. This may explain why some top scientists can live within the regulations of institutional laboratories.

But this is not the rule. In the established altruistic team, one has to conform, obey, forget private interests, and avoid competing. A company seeking talent for research must expect trouble, as might the owner of a racing stable who wants to buy a fast horse. If he makes a good buy and puts his animal in with

hampered. In this way the institution adjusts somewhat to the needs of the inventor. The point is, however, who is going to receive such favors? Who will be the judge as to performances? Will the profit realized by the scientist's work be the criterion, or will it be the technological advance achieved?

The company may be tempted to "gild the bird's cage" — to establish the research elite in a palace provided with the latest equipment. There are a few glaring examples of this, but no success stories are reported. Or the institution might attempt extra remuneration for talent by let-

Does team research stifle creativity?

Is all independence of thought lost in the research team? Are team research results too often of mediocre caliber? Dr. Kroll is outspoken in his concern about team research threatening the extinction of the lone scientist. Perhaps you have some thoughts you'd like to express on team versus individual research. If so, we'd like to hear about them. Send your comments to The Editor, CHEMICAL PROCESSING magazine, 111 East Delaware Place, Chicago 11, Illinois.

mules, there will be no racing, only riot, and another mule will do better than his fine horse. Thus a team of mediocrities tears down a good leader.

Captive Inventor

Some companies are aware that the creativity of the lone-wolf scientist is hampered if he is deprived of his liberty and forced to conform. Therefore, these companies permit some research men of exceptional ability to pursue certain projects un-

ting it participate in the profits of invention. This is usually disruptive for the group. A team never invents anything, its individual members do the inventing. To record who did what at what time, to establish invention priorities, only leads to conflict because of the material interests involved.

Commonly, the captive inventor will deliver to his company the product of his thoughts in the form of a patent application. For this he will be given a token of one dollar, and have his name printed in the title, for the glory. This is the price the inventor pays for a relatively secure life within an organization. This situation, for which there is no apparent cure, results from the principle of altruism that must rule research by teams, as opposed to the principle of the grabbing individual. The lone inventor is evidently the antithesis of the company man. Both mix only with great difficulty.

"Average American" Scientists

The lack of understanding of the inventor's mental attitude by many business executives is well described in "Organization Man." The author of this book mentions a moving picture which he saw while visiting one of our leading chemical companies.



'The lone inventor does not have to sit in unending conferences to decide what to decide, and to conform to the conformers. Like the artist, he cherishes his freedom of expression.'

To page 87

Interest in industrial use of ionizing radiation is sky-rocketing. Deciding what 'tool' is best for your purpose isn't ABC-simple. To help you make this all-important decision, here is a summary of chief factors in the . . .

ECONOMICS OF RADIATION APPLICATIONS IN CHEMICAL PROCESSING

DR. L. G. COOK, Project Analyst
Research Laboratory, General Electric Company
Schenectady, New York



LESLIE G. COOK graduated from the University of Toronto, Canada, in 1936, where he majored in physics and chemistry. Awarded the Gertrud Davis Exchange Fellowship, he went to the Kaiser Wilhelm Institut für Chemie, Berlin, Germany, where he performed graduate work in radiochemistry with Professor Otto Hahn.

Upon receipt of his PhD, Dr. Cook went to the Cavendish Laboratory in Cambridge, England, where he did post-graduate research in radiochemistry and very early work on fission products right after the discovery of fission by Professor Hahn in the fall of 1938.

In 1939, he joined the Aluminum Research Laboratories, research subsidiary of Aluminum Ltd. Dr. Cook became associated with the Canadian Atomic Energy Project in 1944. He served as director of the chemistry and metallurgical divisions from 1954 to 1956. He joined General Electric in 1956.

Economic aspects of the application of radiation to chemical processing have been discussed frequently, but not always with detailed comparisons of the economics of various types of sources. Since the technical and accounting problems are very complex, such comparisons are difficult to make.

For example, a radioactive source costing \$1 million might do the same job as an electron-beam accelerator priced at \$100,000. But initial capital costs are only part of the picture. Annual operating costs must be considered.

Cost of the radioactive source lies almost entirely in its initial price and the required earnings on this capital which has to be invested in it. Operating costs are small. The initial price of an accelerator, on the other hand, is relatively low. It costs more, however, for maintenance and parts replacement. Unless practical and reliable estimates of these two completely unrelated items are available, a comparison is of little significance.

There are other big differences too. Accelerators provide point sources of radiation, while radioactive nuclides provide extended sources. Machines require parts replacement but maintain their output, while radioactive sources continuously decrease their output. Accelerators produce radiation only when required, but radioactive sources produce radiation whether required or not. Machines can be readily disposed of when no longer needed, but radioactive sources must be safely stored even when weak and no longer of use.

Basic Factors

Basic factors in cost of radiation are: 1) amount of radiation required to be absorbed per unit mass of product, and 2) unit cost of radiation energy absorbed in the product.

It is not enough to know the "cost of radiation" as "produced" by a source, for losses by unprofitable absorption in conveyors, shielding, etc. are unavoidable and may run as high as 90%, or as low as 10%. The whole proposed installation for irradiation of a specific product must be considered as an engineered unit to obtain the true cost of irradiation per unit of energy absorbed by the product.

Once cost of irradiation is known, technologic and logistic advantages of the product or

process must be examined to see whether the cost is tolerable.

Purchase costs of radiation sources are only one factor in the costs of irradiation. For those sources with a high purchase cost, irradiation costs are dominated by the required earnings on the capital. For those sources with a low purchase cost, operating and service costs play a much greater role. Nevertheless, purchase costs of radiation sources are basic figures which must be available on which to construct a cost structure.

Cobalt-60

Co-60 is typical of sources which are made by neutron irradiation. Assuming a purchase cost of a specialized uranium reactor to provide neutrons to be

Isotopes or Machines?

Numerous companies are investigating the effects of ionizing radiation on chemical, pharmaceutical, petroleum, food, and other products. Many of these applications are on the verge of becoming commercially practical. A whole new field of radiation chemicals may soon be with us.

Recent years have brought notable advances in the "tools" necessary to conduct this work. Today there are various types of radiation sources available. Included are machine-made X-rays and electrons, isotopes and waste fission products, and direct use of reactors and fuel elements.

The question arises: Which one to use? Each source has its advantages and disadvantages. Items such as initial cost, power economy, penetration efficiency, safety, and machine size must be considered.

The overall economics of the operation however, may be the deciding factor. This article analyzes the problem from the cost point of view. It presents a detailed economic comparison of different radiation tools and tells what you can expect to pay for "low-cost" radiation.

The Editors

Radiation Economics — From preceding page

\$100/thermal kw, an estimate of the possible future cost of Co-60 can be made by estimating the operating cost of such a reactor as follows:

Annual capital recovery (over 10 years), \$/thermal kw	10
Annual earnings before taxes on average capital invested during the 10-year period at 30% per annum ($100/2 \times 0.3$), \$/thermal kw	15
Annual fuel cost and operating charges, \$/thermal kw	50
Total annual operating charges, \$/thermal kw	75

With 0.8 neutrons/fission available, this amounts to approximately 0.0013 mole/thermal kw/year. Neutron cost is therefore about \$58,000/mole.

Since approximately one mole of neutrons is required to make one mole of Co-60, we can assume the cost to be about \$60,000/mole Co-60. Based on the definition of a curie, we see that this amounts to approximately 90c/curie of Co-60. Since about 67,000 curies are required to produce one kw of gamma-ray power, we have a purchase cost of \$60,000/initial kw of gamma-

ray power from Co-60.

Present costs of Co-60 are 2 to 10 times this (according to the specific activity). The first industrial production price is expected to be \$2/curie for 10 curies/gram specific activity.*

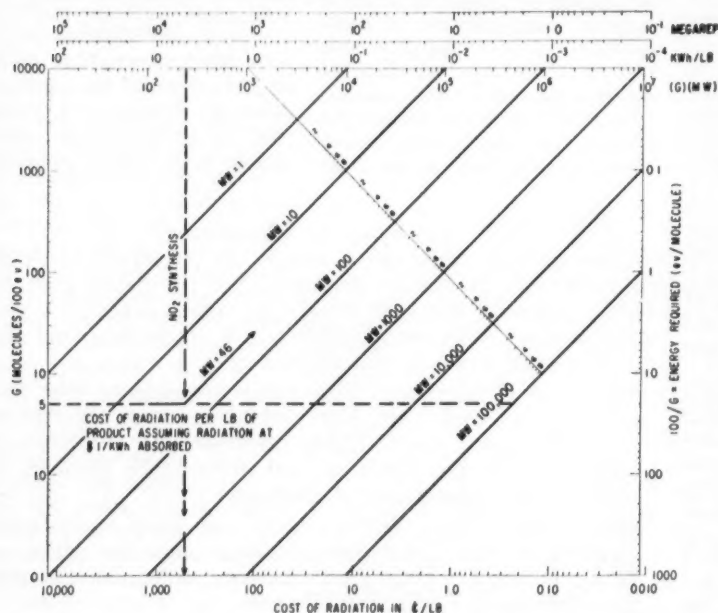
Costs 15 times lower than this (6c/curie) have been suggested as "rock bottom by AEC commissioner, W. F. Libby. This is equivalent to \$4000/initial kw of gamma-ray power. The order of magnitude to which charges for capital costs, earnings, and fuel and operating costs of a reactor to achieve this, must be reduced is evident.

Thus, Co-60 costs range about \$500,000/kw of initial gamma-ray power for 20-30 curies/gm (at present time), \$120,000/kw for 10 curies/gm (in the planning stage), \$60,000/kw for 30-50 curies/gm (as shown in previous calculations), and \$4000/gm for unspecified curies/gm ("rock bottom").

Cesium-137

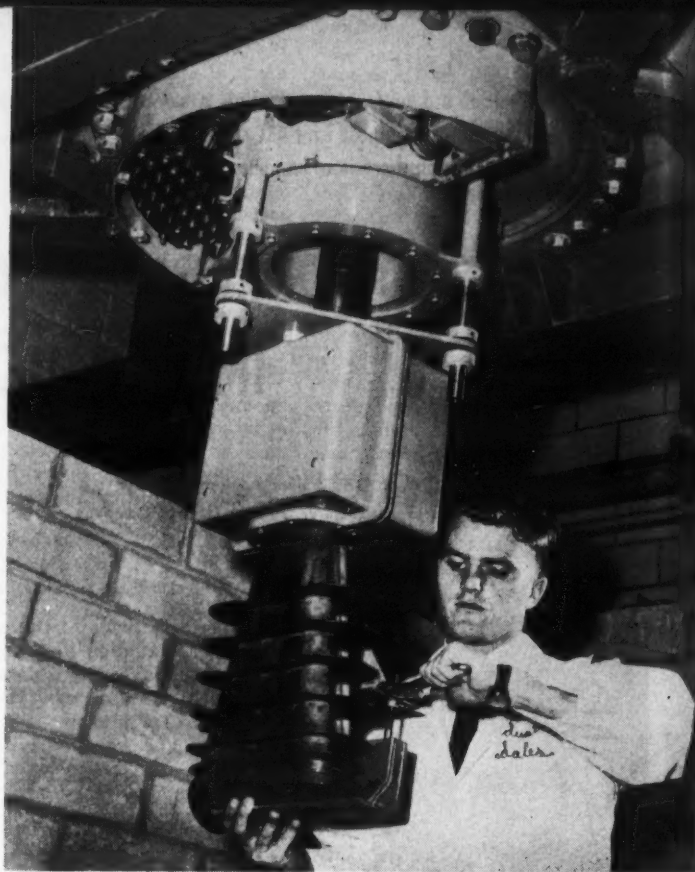
Cs-137 is a separated fission product. Its purchase price is based almost entirely on its chemical separation and purification costs. Estimates ranging

*D. C. Brunton — Nuclear Congress, Philadelphia, March 1957.



Cost of Radiation

Assuming a standard cost of \$1/kwh for radiation absorbed in the product, the approximate cost of radiation per lb of product can be read on this chart. Example: If synthesis of NO₂ has a yield $G = 5$ molecules of NO₂ per 100 ev, one locates $G = 5$ on left scale, moves horizontally to MW (molecular weight) = 46 and reads off \$5/lb on bottom scale, 5×10^5 megarep and 5 kwh/lb on top



"... Although machines produce radiation only when needed, they require service and parts replacement to maintain their output..."

from "rock bottom" 30c/curie to 3-\$4/curie have been made.

If we assume \$1/curie and note that about 240,000 curies are needed to produce one kw of gamma-ray power, we have a purchase cost of \$240,000/initial kw of gamma radiation. Thus, even the "rock bottom" estimate of 30c/curie implies \$80,000/initial kw of gamma-ray power.

Linear Accelerators

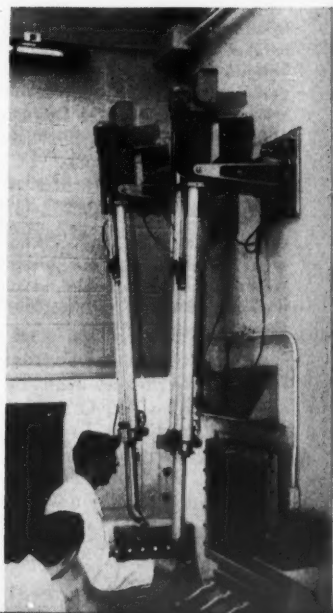
Linear accelerators presently cost 35,000-\$40,000/kw of electron beam. However, on the basis used for the radioactive nuclide prices — a sufficiently large market to allow quantity production — costs of \$10,000 or even \$5000/kw may be projected.

Resonant Transformer Accelerators

Resonant transformer accelerators at present cost 10-\$12,000/kw. However, on the basis used for radioactive nuclides — a sufficiently large market to permit quantity production — costs might drop to \$5000/kw or even less.

Other types of sources, such as mixed fission products, spent fuel elements, reactors used as direct sources, sodium reactor

"... Cobalt-60 as a radiation source means a lower capital cost than cesium-137, but one is purchasing a gamma-ray source which exhausts itself 50% in 30 years..." Photo shows technicians at Cities Service, Cranbury, N. J., research laboratory using master slave manipulators to handle cobalt-60 inside hot cell



coolant, etc., are more difficult to assess. To be considered really "low-cost", however, they must provide radiation for 5000-\$10,000/kw of radiation power (preferably less) — or the equivalent on a rental basis. Based on a source purchase cost of \$10,000/kw, the rental equivalent can be estimated as follows:

Purchase cost of source, \$/kw	10,000
Annual capital recovery (over 10 years), \$	1000

Annual earnings before taxes on average capital invested during the 10-year period at 30%/annum (10,000/2 x 0.3), \$	1500
--	------

Annual Cost, \$/kw of radiation power	2500
---------------------------------------	------

Thus, an annual rental charge would not be "low-cost" unless it were less than \$2500/kw of initial radiation power. This means less than a few cents per "effective" curie — as can be seen by comparing with the Cs-137 costs.

These other types of sources need very careful examination for feasibility, since the costs required of them to be "low-cost" are so small as to leave little margin for preparation or handling costs.

The assessment of purchase costs of radiation sources is unfortunately not only a matter of \$/kw, because one is not always purchasing the same thing.

For example, the purchase of Cs-137 as a source means high capital cost per kw, and one is purchasing a gamma-ray source which exhausts itself 50% in 30 years.

The purchase of Co-60 as a source means a lower capital cost, but one is purchasing a gamma-ray source which exhausts itself 50% in only 5 years.

The purchase of Van de Graaff or linear or resonant transformer accelerators means still lower capital cost; and there is no problem of "exhaustion." On the other hand, one is purchasing an electron source which will require servicing and replacement parts.

The cost of the radiation

	331	332	334
Epoxide Eq. Wt.	187-193	179 Max.	178-186
Viscosity (cps.)	11,000-16,000	6400 Max.	500-900
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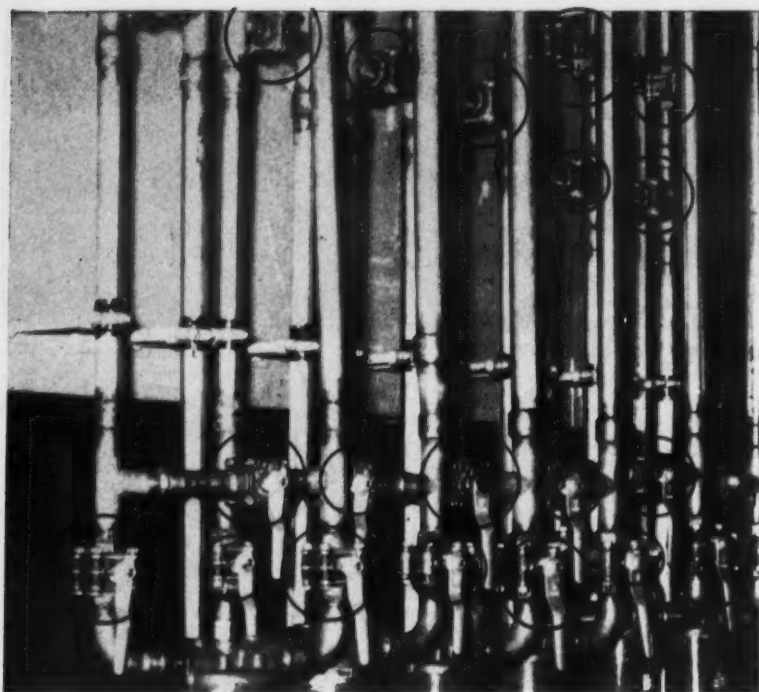
specifications. It will also enable Dow to introduce, in the near future, a complete line of solid epoxy resins and a new line of polyfunctional liquid epoxy resins outstanding in high temperature service.

Prompt delivery of these three Dow Liquid Epoxy Resins can be made in drums, truck or tank car lots. For more information contact your nearest Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Coatings Sales Dept. 2259Q-1.

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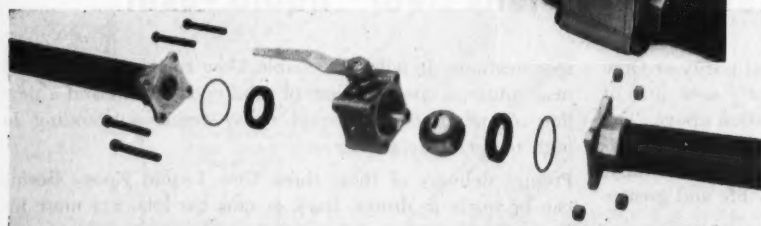


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CHEMICAL BUSINESS

output from sources depends, in varying measure, on

- 1) Capital accounting techniques
- 2) Service and operating costs.

High-grade securities and low-risk fully secured loans return 3-6% per annum. A medium-risk business investment requires at least 10-15% net earnings after taxes to attract capital — which is 20-30% before taxes. Hence, a one-kw Cs-137 source (at \$1/curie or \$240,000/kw) could easily cost 50,000-\$75,000 per annum in required investment return alone. At the other extreme, a resonant transformer accelerator might require only 1/50 as much capital investment, would have 1/50 as large as annual charge for investment return, and could be replaced completely every year and still be five times more economical.

Costs of Irradiation

Obviously, exact irradiation costs for any particular product can only be obtained by detailed engineering and accounting procedures.

However, at the present stage of development, even order of magnitude estimates can be of value. Here are some approximate calculations comparing cesium-137 with an electron-beam accelerator:

Cs-137

Capital cost \$240,000/kw of initial gamma-ray power	
Annual capital recovery (over 10 years), \$/kw	24,000
Annual earnings before taxes on average capital invested during the 10-year period at 30% per annum (240,000/2 x 0.3), \$/kw	36,000
Annual operating costs, \$/kw	500
Total annual costs, \$/kw	60,500
The one-kw source produces 8760 kwh of gamma energy per year	

Cost of radiation therefore equals about \$7/kwh

If we assume arbitrarily that 50% of the radiation energy is actually absorbed in the product, then the cost of radiation equals \$14/kwh absorbed. On a one-shift, 5-



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CHEMICAL PROCESSING

CHEMICAL BUSINESS

day-week basis, the source would be used 2000 hours per year only, and the cost would become \$60/kwh absorbed.

Accelerator

Capital cost	
\$10,000/kw	
Annual capital recovery	
(over 10 years), \$	1000
Annual earnings before taxes	
on average capital	
invested during the	
10 year period at 30%	
per annum (10,000/2	
x 0.3), \$	1500
Auxiliary equipment	
and operating costs,	
\$	2000
Total Annual Cost,	
\$/kw	4500

In continuous operation, the source produces 8760 kwh/yr. Therefore, cost of radiation equals \$0.5/kwh

If we assume that 50% of the radiation produced can be profitably absorbed in product, we have a cost of \$1/kwh absorbed.

On a one-shift, 5-day-week basis, the source would be used about 2000 hours per year only.

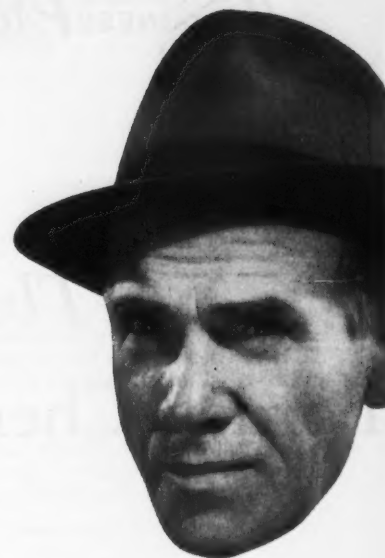
Thus, the auxiliary equipment and operating costs might be cut by a factor of four, to 500 from \$2000. The capital recovery and earnings items would not change.

Hence, the total annual cost might be reduced to \$3000/kw when producing 2000 kwh/year. Thus, the cost of radiation would be \$1.50/kwh, or \$3/kwh absorbed.

Conclusions

The lowest projected costs for radiation sources of the types discussed are of the order of thousands of dollars per initial kw of radiation power. It also appears that purchase costs of accelerators in the 5000-\$10,000/kw region, Co-60 in the 60,000-\$100,000/kw, and Cs-137 in the 200,000-\$300,000/kw region are about equally probable.

Industrially successful radiation applications will be those which are able to pass detailed and searching examination with respect to both technical and accounting factors.



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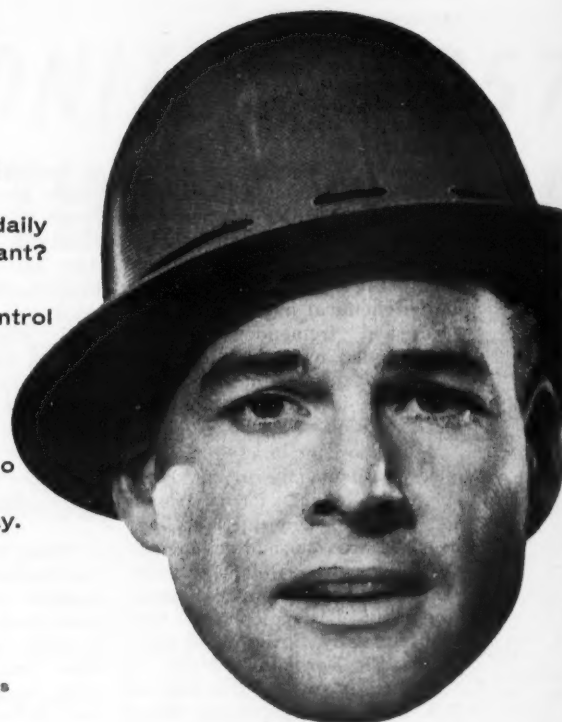
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The **Borden Chemical Story**

Borden Chemical's president Gus Marusi:
'... virtually unlimited elbow room for growth'

Bill Schremp
Chemical Business Editor



IN most industries the badge "growth company" generally brings wide smiles of pride to the faces of that company's management, perhaps even a wider one to the controller's face. But in the chemical industry the fast pace and tremendous vitality have tended to deflate the term almost to the ho-hum level — growth is the rule rather than the exception.

Yet some companies in the industry still manage to stand out above the others as true growth companies — generally, at least in the case of smaller companies, by virtue of aggressive selling and even more aggressive market development. One such company, fitting all of these criteria, is Borden Chemical.

Borden is one of the host of U.S. chemical operations which are offshoots of non-chemical parents. Yet the management group has been able to give the company an identity and a corporate image quite apart from the milk company — not always an easy trick when the parent

is an old, established one — which may well grow in significance in the years to come.

Borden Chemical's growth to date has been made up of almost equal portions of acquisitions and internal development. And president Augustine R. Marusi, who was vice president, then president during the company's period of most intensive growth, sheds some light on his plans for the organization.

Markets Now Defined

"True, a great deal of our past growth has been through mergers or acquisitions, but I think perhaps that we've reached a point of diminishing returns now. Our markets — our purpose, really — have been pretty well defined now and this is the time to emphasize internal development of the company.

"While our basic product lines — adhesives, coatings, PVC resins — aren't widely diversified, our markets cover a considerable segment of industry, leaving us

virtually unlimited elbow room for growth. In paper, for example, we've almost trebled our business in the last three years, most of the increase in the last 18 months or so. And there are two or three developments in the works now which, assuming they break right, could well double our polymer business in paper in a very short time.

"The same is true of epoxies. Where we didn't have the facilities to put ourselves in the best market position before, the new epoxy operation will put us in that position now. Our immediate interest is to market a full line of epoxy resins.

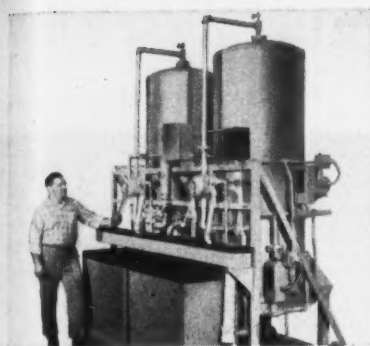
"The situation in the metals industry is somewhat the same. Back in 1952, the phenolic resins market for shell molding, for example, was figured to hit something on the order of 60 million pounds by now. This level of sales — and this represents the whole market, not just our share — hasn't even been approached yet."

Foreign sales and manufactur-

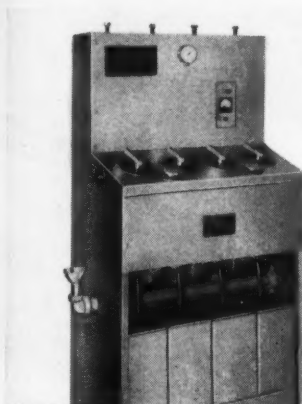
ing hold a particular interest for Gus Marusi. Immediately preceding his stint as v-p, he spent five years as director-superintendent of Alba S.A., Borden's Brazilian operation. He knows the area and likes and holds great respect for the people — and the markets.

"I think every company should have some foreign operations — within reasonable bounds, of course — for two or three reasons. For one thing, foreign markets are to an extent independent of the U.S. markets — they offer considerable stability to a company. They also offer a first-rate training ground for executives, provide a real chance for rounding themselves out. And certainly you can't discount the fact that some areas of the world offer very favorable conditions for manufacturing and marketing.

"But there's another perhaps more important reason," he continues in a tone that reflects his affection for South America, "I think very seriously that we, as



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CHEMICAL BUSINESS

an industrial nation, have an obligation to do all we can to raise the living standards in all of the underdeveloped countries. The best way we can do this, it seems to me, is to help them develop their economies. It's very much the same obligation that a man has toward his neighbor who's having a run of bad luck."

The Early Days

Borden Chemical's history began rather simply and certainly logically. The Casein Company of America, formed about the turn of the century, was in the business of making powdered cold-water paints, an adhesive used in making coated papers, and the first practical cold-water-soluble water-resistant wood glue. In an obvious move to expand its casein markets, Borden bought the company in 1929.

No more chemical activities were taken on until 1939 when a urea-formaldehyde adhesive was introduced, produced under licensing by I.G. Farbenindustrie. By 1940 the company had completed glue plants at Bainbridge, N. Y., and Seattle, Wash., and had started production of a phenol-formaldehyde adhesive.

From then on the chemical expansion came thick and fast.

In 1942 the company announced development of a resorcinol-formaldehyde adhesive, in 1946 a formaldehyde plant was opened at Springfield, Oregon, and at Kernersville, N. C., a liquid urea resin glue plant went into operation.

In 1948, after acquisition of Durite Plastics, Inc., and opening of another formaldehyde plant, the chemical operations were merged into the Borden Company Chemical Division.

The first expansion under the new division's auspices was doubling capacity at the Kernersville glue plant and the Bainbridge formaldehyde operation.

The next expansion was in 1952, and since then the company hasn't let a single year go by without a major expansion or acquisition (it also

To page 230

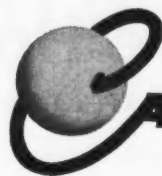
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**CHEMICAL
BUSINESS** / Our Growing
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A view of Olin Mathieson's recently completely dense soda ash facilities at its Saltville, Va., operation

Olin Mathieson has completed facilities for production and storage of dense soda ash at its Saltville, Va., site. The plant also produces light soda ash.

According to John Logan, v-p and general manager of the industrial chemicals division, the plant's \$1-million expansion was to provide for future needs of the glass industry which nationally consumes a little under two-million tons of the material annually.

The Saltville plant, besides soda ash, produces caustic, chlorine, fused alkalis, dry ice, and bicarbonate of soda.

Goodyear Tire & Rubber has let the construction contract for its new polyester film plant to be built at Apple Grove, W. Va. The \$9-million operation, to be running early in 1959, will be put up by

Catalytic Construction Company.

Markets for the laminating film, tradenamed Videne, will be in paper, metal, textiles, plastics, as well as in the general packaging field.

Hercules has announced beginning of construction on a major facility for development and production of solid propellants for long-range rockets and missiles.

Operated by the company's newly formed chemical propulsion division, the Bacchus, Utah, plant will be on a site adjacent to Hercules' Utah commercial explosive plant.

According to the division's manager, Fred Hakenjos, the plant will be "developing fuels for space hardware in any size now contemplated."

Kolker Chemical Company has made public plans to con-

Check 5457 opposite last page

struct a phthalic anhydride unit at its Newark, N. J., plant site. The unit will have a capacity of 15-million annual pounds and, along with Witco's soon-to-be-constructed 20-million-pound plant, will boost U. S. capacity to about 410 million pounds yearly.

American Cyanamid has started production at its multi-million dollar catalytic aniline plant at Willow Island, W. Va. The plant uses a fluid-bed reactor and new catalyst for the first time in manufacturing aniline from nitrobenzene by a reduction process. Use of the new process is expected, according to Dr. William Bowman, general manager of the organic chemicals division, to permit cost reductions in aniline production.

Metal and Thermit has placed its Carrollton, Ky., organometallic chemicals facility on stream. Built on a plot of 150 acres, the first products of the plant will be bis tri-n-butyltin oxide, a biocide for the paper industry; dibutyltin dilaurate, used in poultry medicine; and other butyltin compounds for stabilization of chlorinated compounds such as vinyl plastics.

Celanese has announced completion of a unit at its Belvidere, N. J., plant to produce polyvinyl acetate emulsions. Annual capacity of the installation is in excess of 20 million pounds.

PVAc emulsions were formerly produced at the company's Linden, N. J., plant, which will now be devoted to making polyester resins. The Belvidere installation also produces cellulose acetate and cellulose propionate molding powders, cellulose acetate extruded and cast film, and triacetate photographic film base.

Escambia Chemical Company's methanol plant has been placed on stream near Pensacola, Fla. It is Escambia's third production unit in the Pensacola area. The unit is the first plant in the Southeast to manufacture methanol, and has a capacity of 16-million gallons per year.

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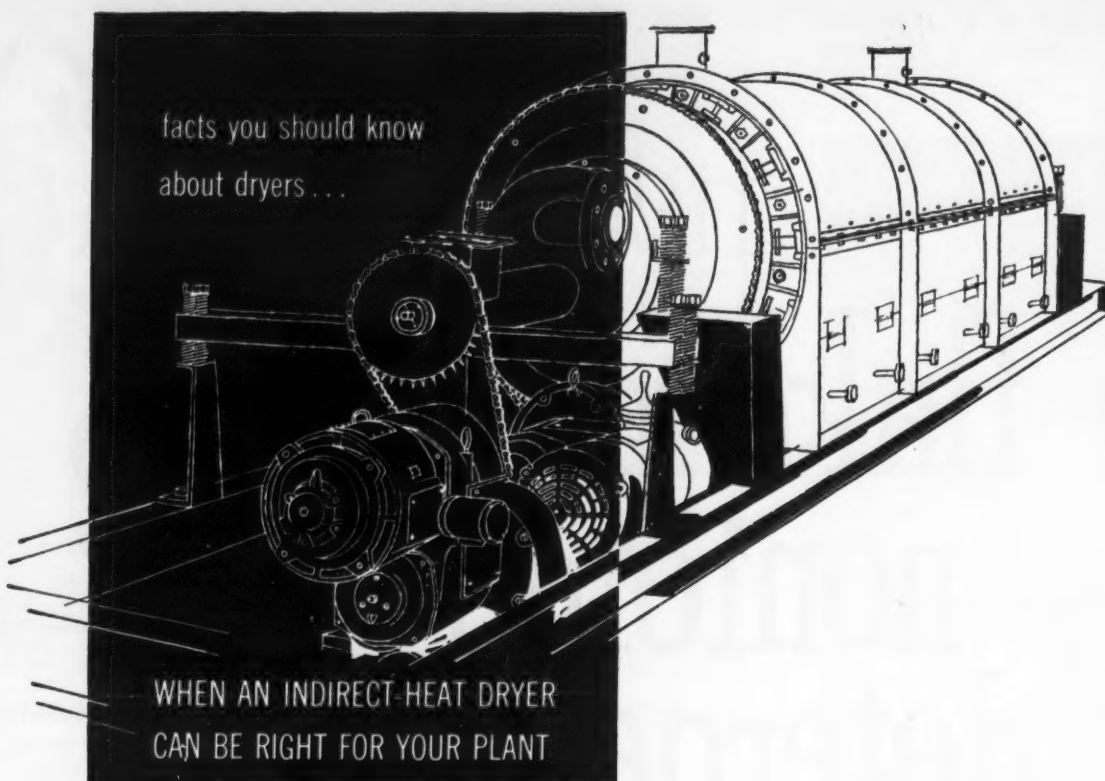
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Check 5458 opposite last page



For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The records of this experience can often be applied to specific cases, possibly yours. For example . . .

Q. My material is a filter cake, practically all minus 325 mesh, and must not contact furnace gases. It can be heated to 500° F. at least, without injury. What type of dryer would do the job best?

A. You might consider using a direct-heat rotary dryer that utilizes clean, heated air as the drying medium—air heated by steam coils or a gas or oil fired heat exchanger. However, this introduces a considerable dust collection problem. Besides, from a standpoint of capacity, it is inefficient as well as from a heat-cost standpoint. This makes it unduly expensive. Therefore, a type of indirect-heat rotary dryer is indicated which would greatly reduce both the

dust problem and the heat cost.

Q. What is meant by an indirect-heat rotary dryer?

A. One in which the material to be dried is warmed by contact with the heated metal surfaces, which in turn are heated by the medium used (usually furnace gases or steam). Those using furnace gases are called "indirect fire dryers". Atmospheric and vacuum drum dryers are examples of steam-heated indirect dryers, but the type in greatest use is the steam tube dryer. This is often referred to as the "Louisville Type" because of the thousands of Louisville Steam Tube Dryers built during the past 55 years.

Q. How does an indirect-heat dryer minimize the dust problem?

A. In an indirect-heat dryer, only enough air is admitted to carry off the evaporated moisture. Thus, the air has nothing to do with the heating

of the material. Generally, this low air velocity results in insignificant dust loss.

Q. How does this differ from the operation of a direct-heat dryer?

A. In direct-heat dryers, the hot air furnishes the heat for drying besides removing the evaporated moisture. The amount needed to supply the necessary heat results in a sufficiently high velocity through the dryer to carry out an excessive amount of fine material particles.

Q. It seems I need an indirect-heat dryer. How can I get competent advice and more information regarding my particular requirements?

A. The Louisville Dryer engineering staff will be glad to analyze your requirements, arrange for necessary pilot plant tests, and submit an unbiased recommendation accompanied by estimated costs. You incur no obligation by using this service.

CHEMICAL BUSINESS



Victor Chemical Names Contest Winner

No doubt convinced that it indeed "pays to see Victor," Fred J. Roeben, of New York's Consolidated Edison, has been named winner of Victor Chemical's recent contest of that name.

Roeben received an expense-paid trip to Hawaii for successfully solving a puzzle based on the company's product names (no solutions were completely accurate, his had one mistake, the runner-up had two).

He's shown here accepting the prize from Victor v-p. in charge of sales, Morris R. Stanley (right).

Chalk Up New Polyolefin System for Carbide

Although the company makes it clear that "no commercial application is contemplated at the moment," a new catalyst system for low-pressure polyethylene recently announced by Union Carbide's Bakelite division is generating more than a modicum of interest. And although the material has yet to be produced on even a pilot-plant scale, early evaluations indicate a considerable advance in the art.

The key to the process is the catalyst system, aluminum chloride and tetraphenyl tin, with a trace of a vanadium compound. Carbide feels that the fact that the catalyst is



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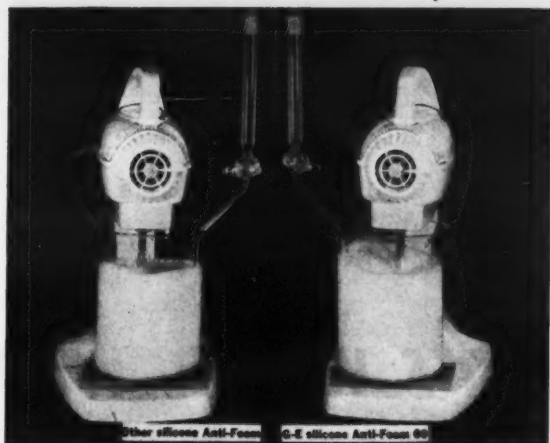
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completely soluble in hydrocarbon solvents will be of considerable importance when a commercial process is designed.

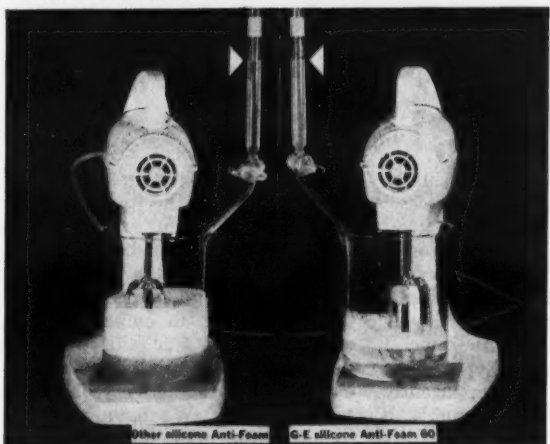
In theory, at least, the process will be simple: Ethylene gas is bubbled through the catalyst solution, the polymer precipitates out for further separation and drying. And although the point hasn't been discussed yet, it's possible that the process may minimize catalyst separation problems which caused no end of trouble in some other commercial processes.

The material itself shows promise of improved properties for some applications. While number average molecular weights for current polyethylenes of all densities are on the order of 5000 to 30,000, the new Bakelite resins have numbers of 65,000 to 125,000, somewhat beyond the range of conventional molding equipment. The potential density range is somewhat broader than available resins, although the current top is about 0.96. Melt index on the resins is generally lower than 0.05, compared with indices of from 0.5 to 20 on current polyethylene.

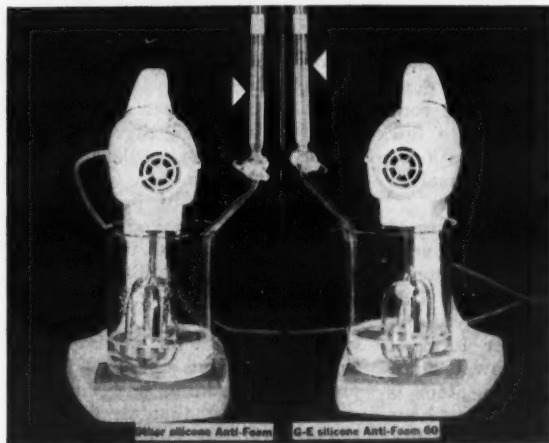
The new catalyst system developed by Bakelite's Joseph Smith and Wayne Carrick, takes its place among a host of systems already in use or developed — e.g. Ziegler, Phillips, Standard Oil, R. S. Aries, Allied — and is almost sure to find a great deal of additional company as time goes on. Although Allied has been making an extremely high molecular weight resin (around 200,000) for piping almost exclusively, it has recently announced work on material for general use for films, molding and such. And according to the company, "the new process will allow lower capital expenditure per pound of capacity than existing methods." And, in a joint venture, Celanese and National Lead are doing research on olefin polymerization using titanium catalysts. Nothing has come out for public view yet, but indications are that the companies are making considerable progress.



TWO IDENTICAL DETERGENT SOLUTIONS are beaten for 10 minutes at the same speed. Left burette contains dilute solution (0.1% silicone solids) of other leading silicone anti-foam. Right burette contains similar solution (0.1% silicone solids) of G-E Anti-Foam 60.



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Check 5460 opposite last page

Sharp in today's focus of events is the controversy over the federal government's role in the peaceful use of atomic energy. Over \$387 million have been spent in the last four years on the program. What has been accomplished? Has the taxpayer been getting his money's worth? Here is one man's answer and opinions on . . .



JOSEPH E. MOODY, President
Southern Coal Producers' Association
Washington 5, D. C.

RECENTLY I have sharply criticized the existing civilian atomic energy program and proposals for its continuation. I have also criticized proposals that the remedy for the defects of the existing program is for the government to take over in a big way, and in so doing, step up expenditures in the civilian field.

The reaction to my criticism has been very interesting. I have had some approbation but also have been adversely criticized, editorially and otherwise. No one, thus far, has attempted to answer my specific charges. The attitude of those who disagree with me has been: "The coal industry is trying to impede the development of civilian atomic

JOSEPH E. MOODY is a nationally known speaker on labor and industrial relations. As chief executive and administrative officer in the Southern Coal Producers' Association, he is active in all matters of interest to Southern coal fields. Mr. Moody has had 29 years experience in the industry. He is a graduate of Cornell University. A native of Hartford, Conn., he is the father of four children and now resides in Chevy Chase, Md.

energy. It should not and cannot stand in the way of progress."

Obviously, there is a good deal of confusion in the atomic field and a good many persons think any criticism of atomic power is criticism of its development and use in the interest of national security.

Many persons have apparently lost sight of what to me is a fundamental distinction, the difference between the development of a civilian industry by private capital and by the government.

It should be emphasized that I have never criticized and do not intend to criticize the development and use of atomic power for military and defense purposes. Obviously, every cent needed should be spent to develop the atomic weapons necessary to protect ourselves against aggression.

I have attacked only the use of government funds on a very large scale to develop atomic power for civilian uses. This power, once developed, is no different from any other form of power; that is, a kilowatt hour developed through the atom is no different from a kilowatt hour developed with coal, oil, or gas.

The coal industry has never objected to, and does not intend to object to, the attempts by private capital and initiative to bring civilian atomic power to the point where it is competitive

with, or even much cheaper than coal. We might be put out of business. From our standpoint, that would be too bad but it could not be helped.

But for the government, as is the case today, to embark on a crash program for the speedy development of civilian atomic energy raises some very important questions. We have a right to ask these questions since the government is using our money, the money taken from the mine operators and the mine workers in the process, just as it is using the money of all other taxpayers. The size of the expenditures, in this period of most burdensome taxation, needs a careful scrutiny. Another query is whether scientific manpower and other resources are being diverted unnecessarily from other more important efforts.

The questions of public policy need to be looked at. What are the reasons for the speedy development of civilian atomic energy, and are they good reasons? Why is civilian atomic energy singled out for special consideration? Undoubtedly there are many budding and embryonic industries that would like the government to pay research and development costs and turn the results over to them.

Will Cost \$1/2 Billion by 1959

Let us take a look at how much has been spent on the ci-

vilian atomic power program. For the past four years the total is estimated at \$387 million, and the proposed budget for fiscal 1959 is \$124.3 million, which would bring the total to more than a half-billion dollars.

PERHAPS YOU DON'T AGREE . . . with Mr. Moody's stand on this controversial subject. Why not send us your comments — pro or con? Those most pertinent will be published in "Letters from Readers" column (page 15).

What have been the results thus far? The experiments have shown that civilian atomic energy costs many times the costs of power from coal, oil, and gas, and it is likely to cost much more for an indefinite future period.

For example, the atomic reactor constructed at Shippingport, Pa., at a cost of more than \$120 million was put into operation during 1957. The estimate is that the power it develops costs 13 times more than that produced from coal. If it is operated at a normal capacity, it will lose about \$24 million annually.

Furthermore, the estimates of the cost of building reactors and operating them is rising all the time. The Atomic Energy Commission sought the cooperation of private industry in the developing of civilian atomic power. Well and good, but the cost esti-

mates are going up so sharply that private industry is withdrawing wherever possible.

U.S. Control the Answer?

One answer to this situation comes from individuals and groups which want the government to take over completely and step up the program so that reactors will be built throughout the country. Senator Gore, of Tennessee, has a bill in to that effect, which might cost a half-billion dollars to begin with for the civilian-power part of the program.

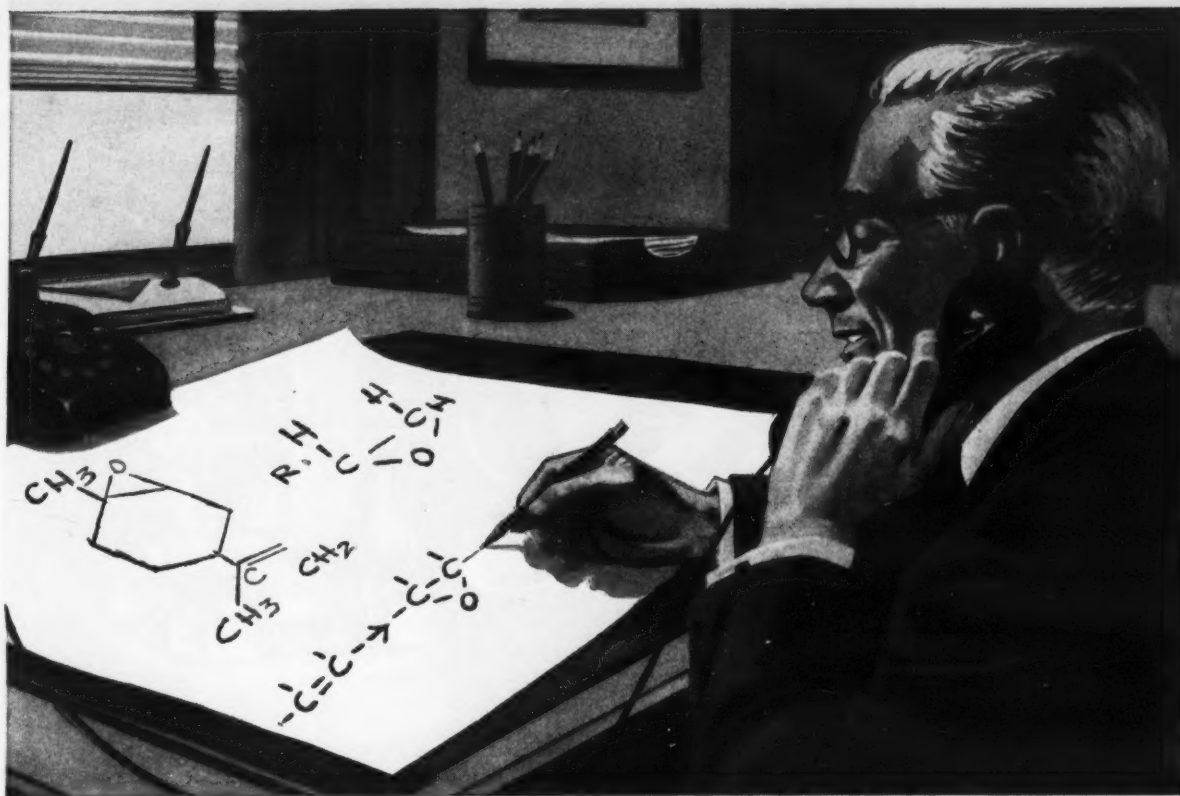
To me, this is like trying to cure alcoholism by feeding the unfortunate individual concerned more and more whiskey.

It might advance the cause of public power if the government built huge and costly reactors to turn out power for electric energy and then subsidized their operation. Yet I doubt that such a plan would do public power much good. Sooner or later the reactors would have to be shut down because their operations would be too big a drain on our economy. Public-power advocates who put over such a program would be in disrepute.

Other Sources of Gasoline Needed

From the standpoint of the nation's needs, it would seem that an emergency program designed to make gasoline obtained from coal or shale competitive with gasoline from oil is more desirable than the civilian atomic energy program. Some authorities estimate that proved oil supplies are sufficient to last for only 11 years. Already, research has proceeded to the point where the cost of gasoline from coal is within five or six cents of the cost of gasoline from oil. The situation in the Middle East is precarious and oil supplies there might be cut off from the free world.

Is the bituminous coal industry advocating a research



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Epoxidation may be the answer and Becco has the know-how... has developed economical epoxidation processes based on the use of organic peracids, preformed or produced *in situ*.

Becco's epoxidation research has also produced several new epoxy compounds; three olefin epoxides,

two terpene oxides... important intermediates in the manufacture of pharmaceuticals, perfumes, flavors; as plasticizers, surfactants and in other uses.

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DESIGNED FOR DEPENDABILITY



This new FORGED STEEL GLOBE VALVE offers maximum strength and safety...longer life!

• R-P&C's new F80 Forged Steel Globe Valve is a versatile, precision-built addition to a distinguished valve family. Designed and engineered in cooperation with many of the country's leading engineers of the power, process piping and shipbuilding industries, the F80 Globe Valve is manufactured to the most rigid standards to overcome the problems of ever-increasing temperatures, pressures and corrosion.

Here are a few of its many features that insure greater strength and safety, longer service life and lower maintenance cost: Forged Steel body, bonnet and gland... "375 Brinell" stem with rolled stem threads... "500 Brinell" disclapped seat face... molded, reinforced asbestos

packing. Test Pressures: Hydrostatic Shell test, 2500 p.s.i.... Seat Test (air under water), 100 p.s.i.... Pneumatic Testing at 300 p.s.i. when specified. For details, write for Folder DH-213.

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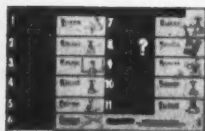


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CHEMICAL BUSINESS

program which would entail an expenditure of several hundred millions of dollars a year in projects designed to decrease the cost of gasoline and chemicals obtained from coal? Not at all. In view of tremendous taxes and the requirements of national defense, a research program for coal should be confined to pilot-plant operations, and expenditures kept as low as is possible in view of the work to be done. What we are pointing out is that a research program designed to lower the cost of gasoline from coal probably has more justification than the existing civil atomic energy program.

Would it not be much better to put the civilian atomic power program on a much more reasonable and less costly basis? Would it not be wise to experiment carefully and economically until we have developed a reactor which promises to be efficient and economical? Would it not be better, in other words, to put civilian atomic power development on a basis where it corresponds to the work being done for other industries?

There is some federal research on coal and its problems, some in the field of agriculture and in other fields, but none on anything like the scale of atomic energy. All are pilot-plant operations. There are none that I know of which say, in effect, "Hurry, hurry, hurry. No matter what it costs, we must put coal, oil, and gas out of business as sources of power, no matter what it costs, nor how long it takes!"

Coal Supply Ample

The world's needs for power are growing and will continue to grow. Yet, there is enough coal in this country alone to last for several hundred years, to say nothing of oil and gas. The argument is made that we must develop civilian atomic power to give to other countries whose sources of power are limited. Yet, we have plenty of coal for sale abroad and at stable and comparatively low prices. How do we know that

To bottom page 89

Check 5462 opposite last page

CHEMICAL PROCESSING

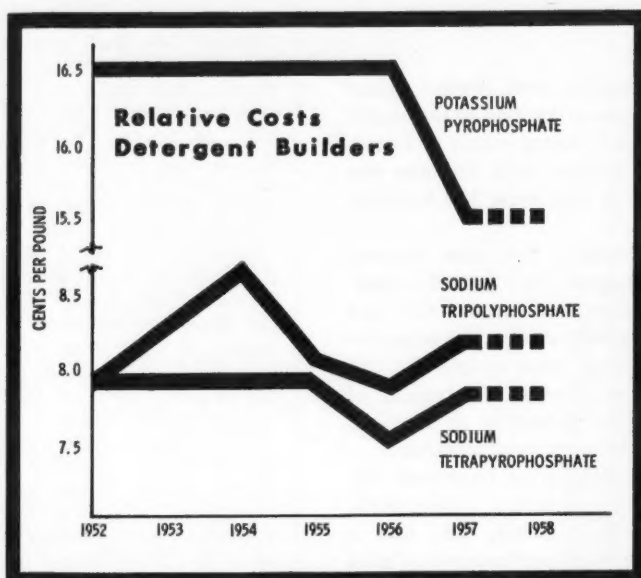
Potassium-based heavy-duty liquid detergents — and prices — have been bothering phosphate producers. Price problems may not be solved but . . .

Dry Detergents Hold Lead Over Laundry Liquids

WILLIAM C. CLARKE
Assistant Editor

Dry detergents promise to remain the sales volume leader in the battle between liquid and dry syndets for quite a while. And, capital outlays by phosphate producers for process equipment to meet a changing demand for their product may not be necessary . . . as some of the producers had feared.

Substitution on a wide-spread scale of the liquid heavy-duty



detergents — which require a potassium rather than a sodium phosphate — for today's dry laundry detergents will probably not take place — for a number of reasons.

Although one of the major soap companies is rumored to have its "steam up", and ready to exploit the market for a liquid home laundry detergent, two problems are involved: the added container cost, and the cost of the potassium-based builder over that of a sodium phosphate, usually tri-poly.

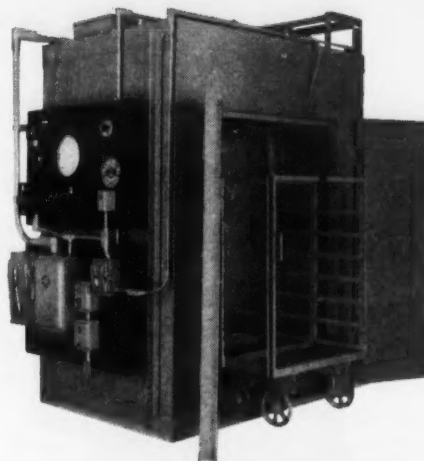
Solution of the container problem appears to rest upon the development of an inexpensive liner material able to resist the heavily corrosive liquids, and at a cost sufficiently under today's figures to be comparable to that of the paper board carton (about 2½ cents).

Some concern is apparent

over the container problem — but industry belief is that once liquids reach large-scale production, container volume will allow a price within a practical range. Another approach is to not use any can liner but rely upon sales volume to move product from supermarket to housewives' shelves before can corrosion occurs to a marked degree.

But, the added cost of the potassium builder may be harder to lick. First, the amount of washing power in

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Standard cabinet and truck type ovens (gas, electric or steam) are available with aluminized steel interiors or with special stainless steel; fume-tight; recirculating fans are interlocked with heating system for shut-off in event of power or fuel supply failure; other safety features.

For drying, baking, curing, evaporating or finishing, Rockwell Ovens are RIGHT for you. What's your heat processing problem?

Write for Bulletins 125 & 126

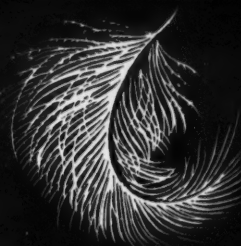


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GREASE KETTLE

Hydraulic-Operated
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New Vertical Drive
Arrangement for
Better Aisle
Clearance

Kettle completely
lined with
stainless steel

This is a stainless steel grease mixer recently completed for one of the major oil corporation's grease plants in Texas. All parts in contact with the mix are made of clad or solid type 304 stainless steel.

Note particularly the new vertical drive arrangement that permits maximum aisle clearance around the unit . . . also the newly-designed hydraulic-operated manhole with special built-in safety features. These are typical of Struthers Wells leadership in modern, efficient grease making equipment.

Are you searching for improved efficiency in your mixing operations? Struthers Wells will help you find it quickly with equipment designed to meet your specific requirements.

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CHEMICAL BUSINESS

a liquid detergent may, of necessity, always be lower than that of equivalent formulations of a dry detergent. Second, potassium compounds — though smaller quantities are used — are already priced higher than sodium counterparts, and supplies are not as available, although increased demand would almost certainly change this quickly.

But the big boost in sales of heavy-duty liquid syndets, noticeable to a marked degree in 1957 (with a rise to more than 10 percent of the total syndets market) is not considered by many in the industry to have demonstrated the superiority of liquids over the dry products.

Foster Dee Snell says that, "It is improbable that liquid syndets will make any such increase in 1958 as they did in 1957. In effect, in 1957 the liquids were receiving the lush sale resulting from the introduction of heavy-duty syndets . . . The liquid syndet must inherently be more expensive than the granular form." Therefore, he expects the liquid syndet to have its main market in light duty such as household dishwashing and not in heavy-duty use such as the household laundry.

Yet, a fact constantly considered by the phosphate producers is that further refinements in the present-day automatic home washer may open up a complete new phase of product diversification. Housewives using present-day washers may stay with now-available dry syndets, while those purchasing to-be-developed self-dispensing automatics may well switch to liquids, regardless of cost or efficiency.

As has already been demonstrated, the popularity of the automatic home washer has been a major factor in increased phosphate usage . . . even to the extent that executive director Guenther Baumgart of the American Home Laundry Manufacturers' Association estimates "the automatic washer means, many times, as much as a four-fold increase in the amount of detergent used by each family."

Washday habits, says Baumgart, change with acqui-

Check 5465 opposite last page

CHEMICAL PROCESSING

sition of an automatic unit. Not only does the ease of washing encourage the housewife to wash more often, frequently every day and averaging six or more loads a week, but also, automatic units change wash water with each load. In contrast, housewives commonly wash several loads with a wringer washer before changing water, adding small quantities of detergent to each additional load.

One result of these washing practices has been the constantly rising rate of soap and detergent usage, to 28.5 pounds per capita in 1957; from 28.0 pounds in 1956, and 21.8 pounds in 1935.

What kind of a market is this detergent industry for the phosphate producers? It is estimated that total soap and detergent sales for 1957 were 3.3 percent ahead of 1956, a record year. And sales of synthetic detergent, both solid and liquid with 71 percent of the total soap and detergent market, reached a new high with a tonnage of 2715 million pounds, 8.4 percent above 1956.

A best guess as to the remainder of 1958, so far as the phosphate producers are concerned, is that over-all yearly production on phosphorous bases for detergents should show an approximate 5 percent tonnage gain, concentrated in the latter three-quarters to half of the year.

Even this relatively small increase is expected to be sizable since the quantities involved concern 40 percent of the industry's total tonnage.

But what about prices? Ever since the price break in 1956 producers have been more concerned because of the constantly increasing cost of production without any immediate price increases to cover the added costs.

Industry people expect the present level to hold for at least the remainder of the year. In any case with the increased tonnage expected in the domestic market between now and 1960, an increase of about 10 percent, phosphate producers will have a volume margin within which to operate.

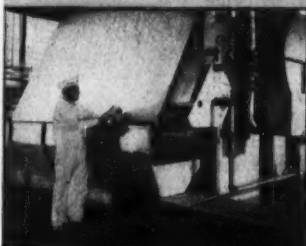
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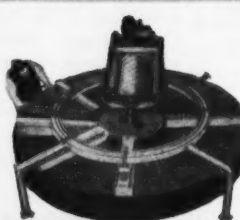
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custom design. In all types of rotary vacuum filters, FEinc's *custom design* has consistently delivered whatever is required. Whether you want higher recovery of valuable solubles with less dilution...lower impurities in finished cake...2-6% less moisture...or just higher output in limited floor space...FEinc can deliver. We'll be happy to conduct complete tests and submit recommendations. No obligation. Write today.

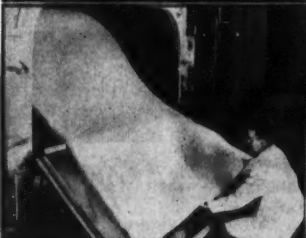
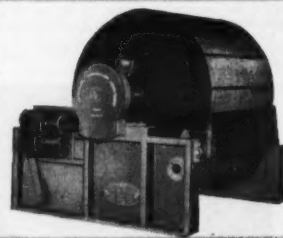
This FEinc String Filter replaced 2 presses and 6 men



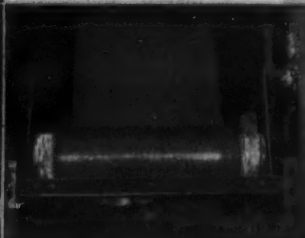
FEinc Horizontal Filter is fastest, simplest for free filtering jobs



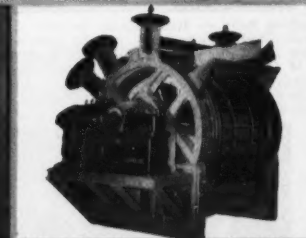
FEinc Scraper Filters are tailor-made for each specific job



FEinc penicillin filter enclosed for steam sterilization



FEinc Roller-Discharge handles clayey materials



FEinc top-feed unit, showing manual drum design

FEinc

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East Moline, Illinois

Custom designed continuous filtration

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NO MAJOR REPAIRS IN 25 YEARS*

Sturtevant Construction Assures Long Mill Life at Top Loads

Sturtevant crushing and grinding machinery answers the long life top-load production problem for medium to small size plants. Many Sturtevants have been operating above rated capacities for more than 25 years, and *without a major repair*.

"Open-Door" design gives instant accessibility where needed — makes cleanouts, inspection and maintenance fast and easy. Machines may be set up in units to operate at equal quality and capacity.



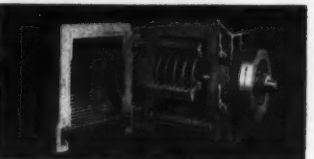
Jaw Crushers — Produce coarse (5 in. largest model) to fine (1/4 in. smallest model). Eight models range from 2 x 6 in. jaw opening (lab model) to 12 x 26 in. Capacities to 30 tph. All except two smallest sizes operate on double cam principle — crush double per energy unit. Request Bulletin No. 062.



Rotary Fine Crusher — Reduce soft to medium hard 3 to 8 in. material down to 1/4 to 1 1/4 in. sizes. Capacities up to 30 tph. Smallest model has 6 x 18 in. hopper opening; largest, 10 x 30 in. Non-clogging operation. Single handwheel regulates size. Request Bulletin No. 063.



Crushing Rolls — Reduce soft to hard 2 in. and smaller materials to from 12 to 20 mesh with minimum fines. Eight sizes, with rolls from 8 x 5 in. to 38 x 20 in.; rates to 87 tph. Three types — Balanced Rolls; Plain Balanced Rolls; Laboratory Rolls — all may be adjusted in operation. Request Bulletin No. 065.



Hammer Mills — Reduce to 20 mesh. Swing-Sledge Mills crush or shred medium hard material up to 70 tph. Hinged-Hammer Pulverizers crush or shred softer material at rates up to 30 tph. Four Swing-Sledge Mills with feed openings from 6 x 5 in. to 20 x 30 1/2 in. Four Hinged-Hammer Pulverizers with feed openings from 12 x 12 in. to 12 1/2 x 24 in. Request Bulletin No. 084.

*Reports Manager W. Carleton Merrill concerning Sturtevant Swing-Sledge Mill at James F. Morse Co., Boston.

**STURTEVANT
MILL COMPANY**

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Check 5467 opposite last page



Spotlight On People

DR. ERNEST H. VOLWILER, president and general manager of Abbott Laboratories since 1950, is elected chairman of the board.

GEORGE R. CAIN, former executive vice president, is elected to succeed Dr. Volwiler as president and general manager.

ROBERT A. MOHRMAN is named assistant to FRANK E. MAPLE, sales manager of industrial chemicals department of Commercial Solvents.

FRANK T. CUNIFF joins Pittsburgh Coke & Chemical as market research manager.

Two new department managers at Carbide's Union Carbide Chemicals Company are RICHARD W. EDDY, manager, new chemicals department; and DE FRANCE CLARKE, mgr., new projects department.

Allied Chemical's nitrogen division announces a reorganization of its development department headed up by vice president F. O. AGEL. DR. E. D. CRITTENDEN, former director of research, becomes consultant to Agel. Newly created positions of associate director are held by DR. L. J. BECKHAM, DR. C. K. LAWRENCE and E. W. BOWEN.

And at Velsicol Chemical . . . JOSEPH REGENSTEIN JR. becomes chairman of the board and E. T. COLLINSWORTH JR., former executive vice president, succeeds Regenstein as president.

DR. SPENCER R. MILLIKEN joins Foote Mineral as research and development-sales staff coordinator.

HEF Inc. announces its board of directors comprised of three members each from the two parent companies, Hooker Electrochemical and Foote Mineral. Hooker's representatives are R. WOLCOTT HOOKER, F. LEONARD BRYANT, and DR. MARION B. GEIGER. Foote's representatives are FELIX B. SHAY, JOHN S. GATES, and W. FREDERICK LUCKENBACH.

Monsanto's boards of directors



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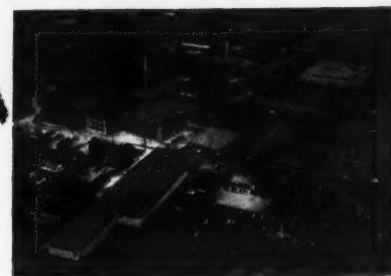


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to keep a good friend!**



Nagle® Pumps

are good pumps and have many good friends in industry. Typical is Behr-Manning Corp. Division of Norton Co. Abrasives is their business. Four Nagle abrasion-resistant pumps are in service at their plant shown above. The first, installed in 1946 in their boiler house, handles clinker laden water—a severe service.

NAGLE PUMPS are built for abusive applications only—abrasion, corrosion, heat, heavily loaded liquids, trash. Complete range of sizes—horizontal and vertical shaft types. Users re-order again and again on basis of performance. **SEND FOR CATALOG 5206.**



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PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

Check 5469 opposite last page

CHEMICAL PROCESSING

PEOPLE

elects JOHN L. GILLIS and T. M. MARTIN to company's executive committee. More news from Monsanto . . . H. HAROLD BIBLE is elected a company v-p and general manager of the Lion Oil Division; IRVING C. SMITH is elected vice president; E. J. CUNNINGHAM is elected controller and director of the company's accounting department; DR. DAVID T. MOWRY is appointed director of development for research and engineering division; J. KENNETH CRAVER is made manager of organic products development for research and engineering division.

Stauffer Chemical elects four new officers . . . ARCHIE ALBRIGHT becomes a vice president, JAMES W. KETTLE is new treasurer, CHARLES LINDSAY is made vice president and general manager of molded plastics division, and CARL ALLEN becomes an assistant secretary.

JAMES K. WATKINS JR. is appointed president of Merchants Chemical Company, succeeding LEMUEL SKIDMORE who becomes chairman of the board.

LAUREL G. PARKINSON is appointed general sales manager-chemicals of Amoco Chemicals Corporation.

ROBERT P. KENNEY is appointed director of international activities for B. F. Goodrich Chemical.

W. F. MUNNIKHUYSEN, retires as Kopper's board chairman and FRED C. FOY is elected to the dual position of president and chairman.

Re-elections at Hercules Powder make ALBERT E. FORSTER president and chairman of the board; WYLY M. BILLING, JOHN J. B. FULENWIJDER, JOHN R. L. JOHNSON JR., PAUL MAYFIELD, EDWARD B. MORROW, and PHILIP B. STULL vice presidents; J. H. T. MCCONNELL secretary; and JOHN E. GOODMAN treasurer.

DR. THEODORE M. VIAL is appointed manager of technical service of the rubber chemicals department in American Cyanamid's organic chemicals division.

NEW

*Savings and efficiencies
in Gas Scrubber Applications*

with the

TURBULAIRE-DOYLE SCRUBBER

With addition of the Turbulaire-Doyle Scrubber to its line of advanced dust, fume and fly ash collection equipment, there is no industrial gas cleaning problem that Western Precipitation cannot handle with equipment of its own design. This assures your dust and fume control problem receiving the benefit of the industry's most complete "know-how" in all phases of gas cleaning operations.

The Turbulaire-Doyle Scrubber—a development of The Consolidated Mining and Smelting Company of Canada Limited and widely used in its own diversified operations—is now made available to industry by Western Precipitation Corporation under a license arrangement with Cominco.

Actual plant records, compiled over long periods of service, show the Turbulaire-Doyle Scrubber to be unique among commercially-available scrubbers in the multiple advantages it offers . . .

- ★ **High Collection Efficiencies**—generally 97% to 99%!
- ★ **Fine Particle Collection**—including those in the fume range!
- ★ **Low Liquid-to-Gas Ratio**—only 1 to 5 GPM per 1000 CFM!
- ★ **Wide Application Flexibility**—readily adaptable to various types of corrosion-resistant materials!



COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
CMP Combination Units
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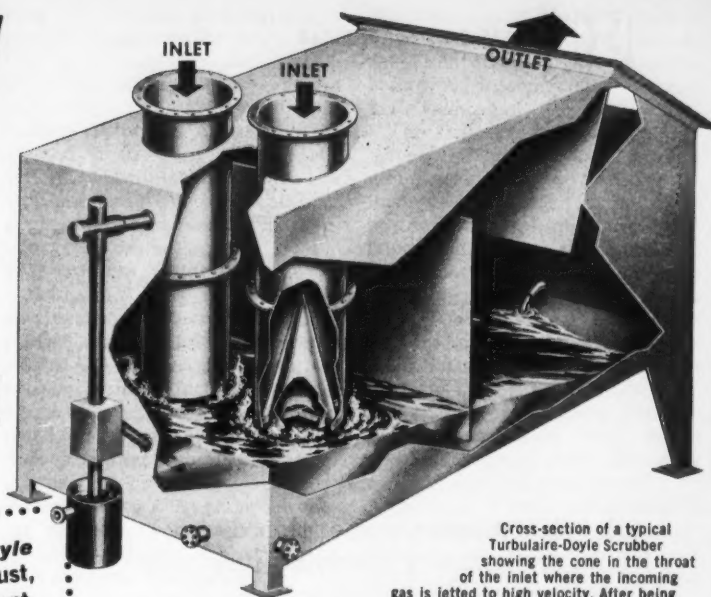
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Cross-section of a typical Turbulaire-Doyle Scrubber showing the cone in the throat of the inlet where the incoming gas is jetted to high velocity. After being cleaned in the scrubbing liquid, the gas passes over spray eliminator baffles before it is discharged. Collected material is carried away by the circulating scrubbing liquid—is recovered as a liquid concentrate or slurry.

SIMPLE, TROUBLE-FREE DESIGN

The Turbulaire-Doyle Scrubber impinges dust-laden gas at high velocity into a bath of scrubbing liquid. The high velocity forces the gas and dust particles to penetrate deeply into the liquid for complete wetting and cleansing. A cone in the gas inlet nozzle, just above the surface of the scrubbing bath, provides the jetting action that assures outstanding performance from this unit. There are no moving parts, nothing to require frequent maintenance!

If you have dust or fume control problems where scrubber types of collectors are applicable, it will pay you to investigate the years-ahead advantages of the Turbulaire-Doyle Scrubber. Write, wire or phone the Western Precipitation office nearest you for further details.

TYPICAL APPLICATIONS INCLUDE:

Cleaning Gases from sintering machines, blast furnaces, roasters, dryers, calciners, crushers, screens, ventilators etc., in a wide range of chemical, metallurgical, rock products, and waste disposal operations.
Cooling and Humidifying Gases from fertilizer, acid, carbonating, smelting, alloying, and reclaiming operations where cool, moist gases are necessary for proper processing.

Check 5470 opposite last page



Here is a relatively unexplored field of chemistry involving new products that are beginning to get attention. Now becoming available on the domestic market for the first time, the products have properties that point to a . . .

Bright Future for Transition Metal Chlorides

DR. HEADLEE LAMPREY

Manager
Chemical Research, Metals Research
Laboratories

DR. CHARLES R. ALLENBACH

Section Leader
Product and Process Development
Department
Electro Metallurgical Company
Division of Union Carbide Corporation
Niagara Falls, New York

Although many of them are still considered to be quite uncommon and rare, the A-subgroup elements of Groups IV, V, and VI of the periodic table are metals rapidly gaining in chemical importance. Just in case you don't have your chart handy, they consist of: titanium, zirconium, and hafnium; vanadium, columbian, and tantalum; and chromium, molybdenum, and tungsten.

With the exception of chromium, chemical salts and derivatives of these transition metals have been quite scarce on the market, and for this reason have found few industrial uses. However, this is soon going to change. Suitable reactive intermediates of these metals are now becoming available for the first time.

We can expect to see a rapid industrial development of transition metal chemicals, both organic and inorganic, with corresponding new applications and end uses.

Metal Chlorides Best

The ideal metal-chemical intermediate is highly reactive, stable enough to be shipped and handled conveniently, and inexpensive. Anhydrous metal halides, especially the chlorides, fit the bill perfectly. They will soon be available with the metals in various oxidation states, thus effectively broadening the spectrum of their properties.

The accompanying table lists some of the chloride products which are commercially avail-

able, or expected soon to become so, and gives some of their physical properties. Other chloride products are also known (for example, $TiCl_2$, $ZrCl_2$, VCl_2 , $MoCl_2$), but they are difficult to prepare in a pure state or hard to ship and handle, and are therefore not included.

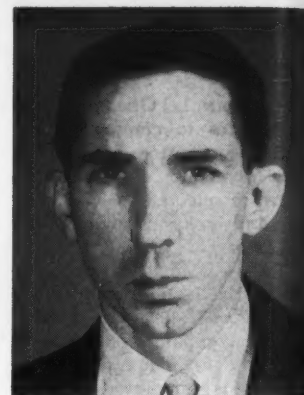
In the higher valence states the metals form chlorides which are liquids or, if solids, they are volatile without decomposition. The lower chlorides are relatively non-volatile. The high chlorides decompose in water, often violently; the lower chlorides are generally soluble, forming hydrates.

With a few exceptions, all the chlorides show a high degree of solubility in organic solvents. They may be handled with ease



DR. HEADLEE LAMPREY, manager, Chemicals Research Group at the Metals Research Laboratories, Electro Metallurgical Company, Division of Union Carbide Corporation, received his BS and MS degrees in Science at the University of Washington and his PhD in Inorganic and Analytical Chemistry at the University of Michigan.

He is the author of 20 patents and publications in the fields of corrosion inhibition and gas technology. His experience has been in the fields of corrosion testing, carbide and acetylene technology, combustion and detonations, consumable products development, and metal organic chemicals. Dr. Lamprey is a member of the American Chemical Society and Commercial Chemicals Development Association.



DR. CHARLES R. ALLENBACH received his BS and PhD degrees in Chemistry from the University of Buffalo, where he also served as an instructor in Chemistry. He is now section leader in the Product and Process Development Department of Electro Metallurgical Company, Division of Union Carbide Corporation.

He is interested in high-temperature inorganic chemistry, new product development work with metal chemicals and metal compounds, and chemical problems associated with reactive metals.

Dr. Allenbach is a member of the American Chemical Society; American Institute of Mining, Metallurgical and Petroleum Engineers; Sigma Xi; and has served on several committees of the American Society for Testing Materials.

PHYSICAL PROPERTIES OF TRANSITION METAL CHLORIDES

	Color and State	°C mp	°C bp	Stability in Dry Air	Solubility in Water	Solubility in Organics
TiCl ₄	colorless liquid	-24.8	136	stable	dec.	sol. alc., ether, dil. HCl
TiCl ₃	black solid	(1)	dec.	stable to 500°	sol.	sol. alc., insol. CCl ₄ , CS ₂ , bz
ZrCl ₄	colorless solid	438 @ 25 atm	subl. 331	stable	dec. to ZrOCl ₂	sol. alcs., esters, ketones
HfCl ₄	colorless solid	432	subl. 590	stable	—	sol. alc.
VOCl ₃	yellow liquid	-77	127	stable	dec.	sol. alc., ether
VCl ₄	red liquid	-26	152	slow dec. to VCl ₃	dec.	sol. abs. alc., ether, CHCl ₃
VCl ₃	pink solid	non-vol.	—	stable	sol.	sol. abs. alc., ether
CbCl ₃	yellow solid	209	254	stable	dec.	sol. CCl ₄ , ether, conc. HCl
CbOCl ₃	white solid	—	subl. 400	stable	sol. (dec.)	sol. H ₂ SO ₄ , alc. insol. HCl
CbCl ₂	—	—	—	heat → CbOCl ₃	sol.	—
TaCl ₅	yellow solid	220	239	stable	dec.	sol. abs. alc., CS ₂
TaCl ₃	green solid	—	—	stable	sol.	—
CrCl ₃	green solid	—	subl. 1300	stable	sol. (2)	—
CrCl ₂	white needles	—	—	stable	sol.	sl. sol. alc.
MoCl ₅	black needles	194	268	heat → MoO ₃ Cl ₂	dec.	sol. alc., ether, ketones, amines
MoCl ₃	red solid	dec.	—	stable; dec. hot	insol.	sl. sol. alc., ether
MoCl ₂	yellow powder	—	non-vol.	stable	insol.	sol. alc., acetone, HCl
WCl ₆	violet solid	280	340	heat → WOCl ₄	insol.; dec. hot	sol. alc., acetone, CHCl ₃ , CS ₂
WO ₂ Cl ₂	yellow crystal	260 (3)	—	stable	dec.	sl. sol. ether

Notes: (1) TiCl₃ sublimes at 425 to 450° under high vacuum
 (2) Green CrCl₃ dissolves slowly; a trace of CrCl₃ added causes rapid solution. Violet CrCl₃ is hydrated and dissolves in water rapidly
 (3) WO₂Cl₂ melts, sublimes, and partially decomposes around 260°

and safety, although some of the more hydrolyzable ones cannot be exposed to moist air without entailing some decomposition and loss.

Chemically, these chlorides are quite reactive. They form addition compounds with organic and inorganic compounds of widely different types. They form substitution derivatives wherein one or more of the chlorine atoms is replaced by an organic or inorganic radical. The chlorides act as starting materials for the preparation of pure oxides by hydrolysis, or of the free metals by

reduction. Only relatively few of these derivatives have been produced to date, some of which are attaining commercial importance. As more of them are studied, other products of commercial use will doubtless be uncovered.

Direct Uses of Chlorides

Some of the suggested direct uses of the metal chlorides are as follows:

1) Titanium Chlorides

TiCl₄ has been proposed for coating glass, stabilizing SO₃, producing smokes and fogs, coat-

ings for metals, preparation of pigments, gelation of nitrocellulose and vegetable oils, textile treatment, waterproofing various materials, gas removal from molten aluminum alloys, and as a catalyst in many organic reactions. Titanium trichloride has also been suggested for catalytic applications and for use in metallurgy of minerals.

2) Zirconium Chloride

ZrCl₄ has been recommended as a catalyst, as a solvent for insoluble metal sulfates, as a component of soldering fluxes, in leather tanning, for gelling vegetable oils, as a vat-dye printing assistant, in hair-waving preparations, in magnesium refining, in preparation of barrier layers, in making asbestos dispersions, coating of glass, waterproofing, and in anti-perspirant preparations.

3) Vanadium Chlorides

Pentavalent VOCl₃ is an excellent solvent of low dielectric constant; the tetrachloride VCl₄ is a catalyst and a soldering flux component; the trichloride VCl₃ is a catalyst for both organic and inorganic systems.

4) Columbian and Tantalum Chlorides

CbCl₅ and TaCl₅ have also been proposed as catalysts.

5) Chromium Chlorides

Anhydrous chromic chloride, CrCl₃, has tanning properties. It has applications as a mordant, in flame metallizing, as a catalyst, for coating metal powders, as an agent for alloying steel powder, and in a process for sealing iron to glass. Chromous chloride, CrCl₂, is a reductant for organic chemicals, an oxygen absorbent, and has applications in the direct chromizing of iron, steel, metal powders, and sintered bodies.

6) Molybdenum Chloride

MoCl₅ has application as a component in volatile brazing fluxes, as an agent for molybdenum plating, and as a catalyst.

7) Tungsten Chloride

WCl₆ has been proposed as a catalyst, as a coating material for making films on glass, as a flux, and as a metal-joining agent.

Intermediates

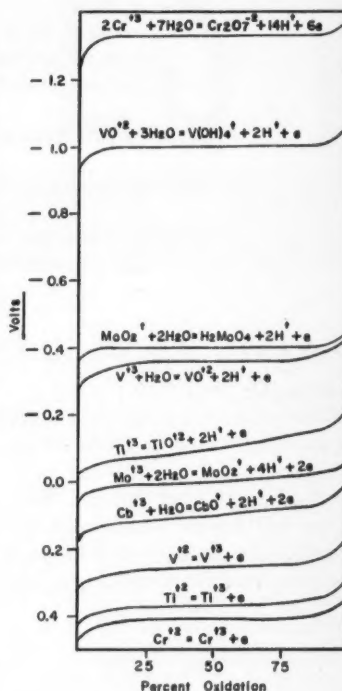
The higher chlorides serve as raw materials for the preparation of reduced chlorides or of the metals. In a commercial process for producing titanium metal, the chloride is reduced with sodium: TiCl₄ + 4Na → Ti + 4NaCl. The chlorides of zirconium and other transition metals may be similarly reduced. In addition, all

the lower chlorides described in this article may be prepared by reduction of the higher chlorides acting as intermediates or raw materials.

The chlorine atoms are replaceable by inorganic groups, giving salts, or by OH groups, through hydrolysis, giving oxide powders, gels, and hydrated bases. Also, on the inorganic side, the metal chlorides form addition products with a wide variety of types of compounds such as ammonia and hydrazine, phosphorus chloride and oxychloride, H₂S, SO₂, HCN, etc. Many of these adducts, like the POCl₃ compounds with HfCl₄ and ZrCl₄, are so stable that they can be distilled unchanged.

There is a rich and relatively unexplored field of organic derivatives of metals, which are easily prepared through the metal chloride intermediates. Many of the organic derivatives produced are commercial products, finding uses as catalysts, inhibitors, fungicides, tanning agents, mordants, fixatives, adhesives, surface-active agents, etc.

To next page



OXIDATION-REDUCTION RELATION OF SUBCHLORIDE COMPOUNDS IN ACID SOLUTIONS

The graphs are idealized values based on published E₀ (50 percent oxidation) values. They show the relative reducing potentials of various subchloride compounds in dilute aqueous acid solutions.

CO₂

the most economical inert gas

Carbon dioxide is a truly versatile chemical: a solid or liquid refrigerant... a pressure-producing and carbonating agent... a chemical that reacts with a select number of substances... and, in apparent contradiction to its chemical uses, a low-cost inert gas with a wide range of applications, many of which have hardly been exploited.

These inerting applications, in fact, may well eventually overshadow the generally accepted ones. Although CO₂ cannot be used in *all* inert gas applications, it can be used in many cases just as effectively as the more costly and less easily handled "elemental" inert: argon, nitrogen, etc.

For example, here are just a few CO₂ inerting uses:

Blanketing explosives and combustibles... solvent dewaxers... alkyd resins (while also providing sufficient pressure for agitation)... within vessels to eliminate oxidation, skinning or bacterial growth from such materials as paints, varnishes, tall oils, etc.

Purging vessels prior to filling with special materials... lines, holders, tanks, etc., while under storage or being emptied... hydrogen-filled generators during repairs... gasoline and oil tanks, etc., under repairs.

Pressure transference of combustibles of all types without pumps.

Shielding welding arcs.

Reducing fire and explosion hazards while materials undergo grinding and pulverizing. CO₂ also reduces temperature of materials prone to soften during these operations.

Mathieson CO₂ comes in a variety of forms and quantities ranging from 50-lb. cylinders and dry ice to 24- and 30-ton tank cars for direct unloading to your process. Why not contact an Olin Mathieson representative soon for an informative discussion that may open new or more economical uses for this safe, tested product.

HERE ARE SOME OF THE IMPORTANT CHARACTERISTICS OF CO₂ VAPOR

Molecular weight	44.004
Specific Gravity	1.527 (when air equals 1) 1.557 (when N ₂ equals 1)
Absolute density	0.114 lb/cu. ft. @ 70° F.
Thermal conductivity	0.590 (air equals 1)
Specific heat	0.19 to 0.21 BTU/lb
Volume, cu. ft./lb	8.79 @ 70° F.
Pressure, saturated	852.5 psia @ 70° F.
Cost, 100 cu. ft.	\$0.455 (CO ₂ costing \$.04/lb)



MATHIESON CHEMICALS

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INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

Check 5471 opposite last page

CHEMICAL MATERIALS

Metal Chlorides

From preceding page

Derivatives of silicon and titanium have been studied fully; corresponding compounds of other sub-group metals remain to be investigated. There is an extensive patent literature in this area already; for example, organic derivatives of chromium are currently being promoted in a wide array of industrial uses, and announcements of new "chrome organics" appear in technical advertisements frequently.

The chlorides of chromium, vanadium, zirconium, and tantalum have been Grignardized, and doubtless the chlorides of the remaining metals of this group could be reacted similarly. This provides a powerful tool for the preparation of a large variety of derivatives of these metals. The production of metal organic compounds from chromous and chromic compounds, and from tungsten and tantalum chlorides, has also been described in the literature.

The metal chlorides form addition compounds with numerous organic derivatives just as they do with inorganic derivatives. Adducts are formed with alcohols, esters, amines, phenols, ketones, and in some cases even with hydrocarbons.

(Additional information about transition metal chlorides may be obtained from Electro Metallurgical Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York.)

Check 5472 opposite last page.

Plastisol viscosity study

Relative data on viscosity-temperature characteristics of many plasticizer systems at low, medium, and high shear rates, and stability after one week aging at room temperature are contained in "Plastisol Viscosity Study" — Firestone Plastics Co., Div. of The Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron 17, Ohio.

Check 5473 opposite last page.

CHEMICAL PROCESSING

CHEMICAL MATERIALS

Cuts use of conventional organic plasticizers in floor finish

Improves film toughness, scuff, slip resistance

Uses: For floor finishes.

Features: Product functions as polymer plasticizer, reducing need for conventional organic plasticizers in floor finish. It improves film toughness, scuff, and slip resistance, depth of gloss, and water resistance. Product eliminates or reduces tendency of hard films to powder.

Description: Acrylic polymer emulsion enables wax chemist to develop clear finishes without compromising on yellowness. Emulsion can be substituted for a substantial portion of dark-colored alkali-soluble resins and waxes.

(U-3050 Ubatol is product of UBS Chemical Corporation, 491 Main St., Cambridge, Massachusetts.)

Check 5474 opposite last page.

Anti-foam compound is very compatible, will not separate

Uses: All-purpose anti-foam can be used in either water or solvent systems.

Features: Compound is easy to handle, will not separate out, has good compatibility.

Description: Defoamer contains no silicones, is non-ionic. It is unaffected by temperature changes, offers good shelf life, and contains no water.

(Defoamer 711 is product of Isochem Corporation, 221 Oak St., Providence 9, R. I.)

Check 5475 opposite last page.

Waxes from coal gas

Bulletin of 12 pages provides general description and specs on emulsifiable hard waxes from coal gas. "Duroxon® Waxes" — Dura Commodities Corp., 20 Vesey St., New York 7, New York.

Check 5476 opposite last page.

METHYL ISOPROPENYL KETONE

VINYL PROPIONATE

VINYL ACETATE

methyl, ethyl, and butyl
ACRYLATES

... produced by the high-purity beta propiolactone process

In its fast developing role as Headquarters for Monomers, Celanese now offers a line of methyl, ethyl, and butyl acrylates—for water base paints, for leather sealants, for textile sizing, for adhesives, for paper coatings—or what have you in mind for them?

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CHEMICALS

In Canada: Canadian Chemical Co., Limited, 2035 Guy Street, Montreal, P. Q. • Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16.

Check 5477 opposite last page



get a Dow Corning SILICONE DEFOAMER!

Is foam robbing you of production? Stamp it out fast with a Dow Corning SILICONE DEFOAMER—the most effective foam killers ever developed.

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kills foam in:

250,000 lb molasses, vat dye solution,
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TITLE _____			
COMPANY _____			
CITY _____	ZONE _____	STATE _____	
Other _____			

Check 5478 opposite last page

CHEMICAL MATERIALS

**New petroleum inhibitor
minimizes deposits,
stabilizes color**

Uses: Product is multi-purpose dispersant inhibitor for petroleum products.

Features: Dispersant has proved exceptionally potent in minimizing deposits and stabilizing color in diesel oils, distillate burner oils, and residual fuels.

Description: Depending upon application, from 5 to 15 pounds of dispersant-inhibitor are required to treat 1000 barrels of product. Applied to refinery streams, the additive prevents deposition and fouling in heat exchangers and reboilers. Crude oil and residual fuel oil tanks and transfer equipment may be kept free of sediment and waxy deposits.

(Polyflo 100 is development of Universal Oil Products Company, 30 Algonquin Rd., Des Plaines, Ill.)

Check 5479 opposite last page.

**Commercial quantities
of barium oxide
97-99% purity**

Uses: In oil additives field that formerly used high-priced barium hydrates to get purity required for manufacture of certain oil additives.

Features: Product is available in commercial quantities at purity of 97-99%.

Description: Barium oxide is produced by fluid-bed process in which barium carbonate and carbon black are starting materials, and are charged together with natural gas at relatively low temperature. Natural gas is used instead of the conventional electric arc. Development of this process required two years.

Result of process is high-purity product in which all carbon black is burned off and a white material consisting of very small porous pellets, is obtained.

(Barium oxide of 97-99% purity is manufactured by Barium Reduction Corp., South Charleston, W.Va.)

Check 5480 opposite last page.

Chemicals
for Solid
Propellant
Systems?

TRONA* has
these products
for your
evaluation.

**ELEMENTAL BORON
BORON COMPOUNDS**

**LITHIUM METAL
LITHIUM COMPOUNDS**

What are your requirements in high energy fuels? More BTU's per pound? More oxidant per unit weight or per unit volume? Whatever your needs, you should consider TRONA boron and lithium chemicals in your programs.

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Market Development Department

**American Potash &
Chemical Corporation**

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Los Angeles 54
California

99 Park Avenue
New York 16
New York

Check 5481 opposite last page

CHEMICAL PROCESSING

Shortcuts in chemical development

"Can chemical companies cut the test-tube-to-tankcar time of chemical development?"

CHEMICAL PROCESSING posed this question to a seminar of experts in the field of chemical development just recently.

Our objective was to try to answer many of the problems faced introducing new chemicals to industry. By bringing both 'supplier' and the 'user' companies together, we discovered a number of shortcuts for the development man.

A feature in August

You'll learn the thinking of the top specialists in this subject when you read CP's Chemical Materials Feature section in August.

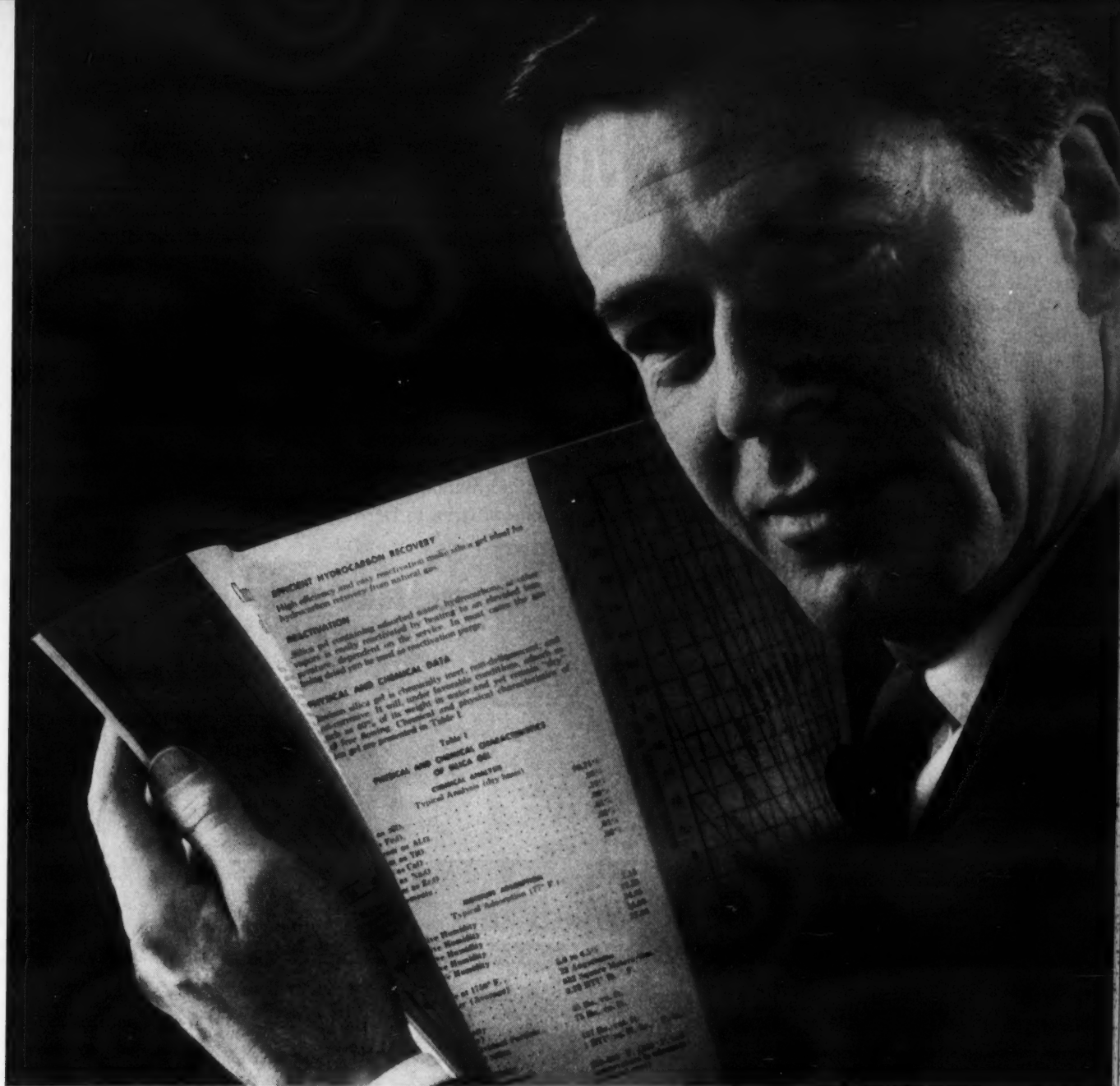
New chemicals to be listed

Besides all this there will be a descriptive listing of chemicals introduced during 1957 and the first six months of 1958.

Look for it!

... in August
CHEMICAL PROCESSING.

For more information on product at right, specify 5482 see information request blank opposite last page.



New from Davison...Technical Bulletin 202 on adsorption and dehydration with silica gel

If you have anything at all to do with air and gas dehydration, you'll want this 20-page, well-illustrated technical bulletin.

Here, in text and graph form, is a wealth of valuable, up-to-date technical data on: characteristics of silica gel; fundamentals of adsorption and dehydration; natural gas dehydration;

recovery of hydrocarbons from natural gas; compressed air dehydration; atmospheric dehumidification; dehydration of industrial gases; special types of silica gel; and other applications of silica gel. The data presented are based on reliable laboratory and field tests.

We're sure you'll find Technical



Bulletin 202 of great assistance in your everyday work. To receive a copy, write to us on company letterhead.

DAVISON
CHEMICAL COMPANY
Division of W. R. Grace & Co.
Baltimore 3, Maryland



For better polymers... use Rohm & Haas

ACRYLIC MONOMERS

The Rohm & Haas acrylic monomers listed below give you the broadest range of acrylic raw materials available. From Rohm & Haas you get not only this wide range of acrylics to help you develop better products, but also information and services on storing and handling the monomers.

The proper acrylic monomer can impart to your polymers or copolymers one or more of these properties:

- Better heat and light stability
- Internal plasticization
- Increased polymerization rate and copolymer yield
- Improved compatibility with other resins
- Stability of emulsions
- Better adhesion properties
- Solubility in alkalies, including ammonia

Polymers of these acrylics can vary in properties from hard, tough solids to semi-liquids, depending upon the monomer used. In copolymerization,

acrylic monomers can be used with vinyl chloride, vinyl acetate, vinylidene chloride, acrylonitrile, butadiene, styrene, and unsaturated polyesters.

Through leadership and long experience in the acrylic field, Rohm & Haas is able to offer sound technical service on the handling of acrylic monomers. This service includes recommendations on transportation, unloading, storage, inhibitor removal, and the design of storage facilities. For complete information about Rohm & Haas acrylic monomers, write to Department SP.

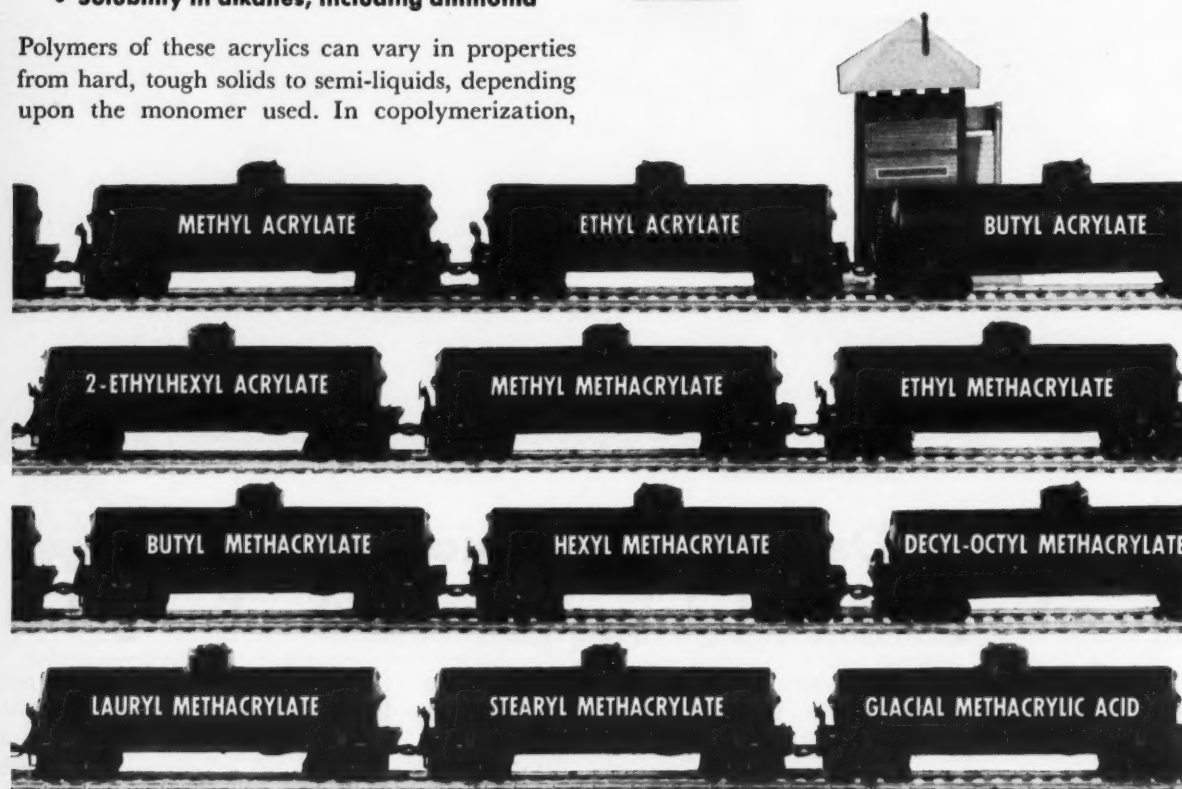


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Available in pilot-plant quantities: **DIMETHYLAMINOETHYL METHACRYLATE • METHOXYETHYL ACRYLATE • GLACIAL ACRYLIC ACID • METHACRYLAMIDE**

Check 5483 opposite last page

CHEMICAL MATERIALS

Long-term stability against heat, light, built into vinyls

Uses: As vinyl plastisol stabilizers.

Features: Materials are designed to give high efficiency, good early color retention, and long-term heat and light stability.

Description: Ferro 1701 is an amber liquid of 0.90 specific gravity and less than A-2 Gardner viscosity. It is recommended as a one-stage stabilizer for pigmented and filled plastisols in concentrations of from 1.0 to 2.0 phr.

Ferro 1720 is an amber liquid of 1.02 sp gr and Gardner A viscosity. It is non-sulfur staining, has good air-release properties, and good viscosity control.

(Ferro 1701 and 1720 are products of Ferro Chemical Corp., 4150 East 56 St., Cleveland, Ohio.)

Check 5484 opposite last page.

Adds allyl alcohol to product line

Uses: As chemical intermediate in production of such diverse products as resins, pharmaceuticals, flavorings, and perfumes.

Features: Since it contains both a double bond and a primary hydroxyl group, material will react both as an olefin and as a primary alcohol.

Description: Allyl alcohol, as produced, has a minimum assay of 98 percent.

(Allyl alcohol is available from The Dow Chemical Co., Midland, Mich.)

Check 5485 opposite last page.

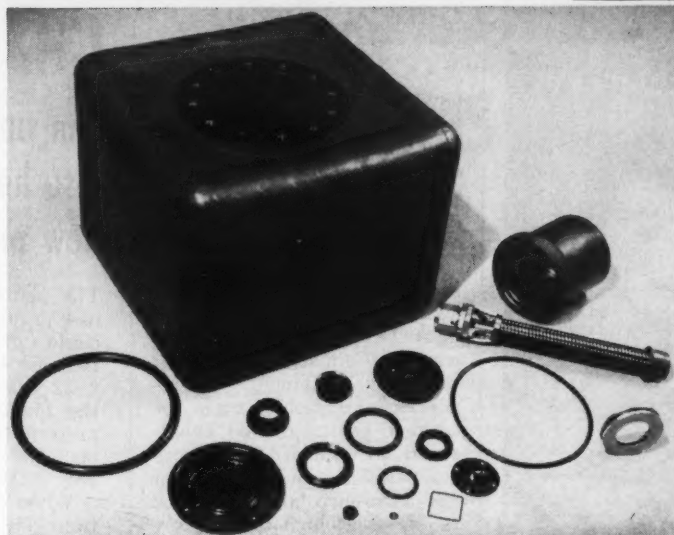
Dispersions for rubber

Eleven-page technical brochure covers complete line of dispersed materials used in compounding butyl, neoprene, and hypalon rubbers. "Kenrich Dispersions" — Kenrich Corp., 57-02 48th St., Maspeth 78, New York.

Check 5486 opposite last page.

CHEMICAL MATERIALS

Products are easily compounded from elastomer, withstand oils at temperatures to 600°F



Elastomer Resists Organics at Temperatures to 600°F

Linear copolymer of vinylidene fluoride and hexafluoropropylene contains 65% fluorine

Physical Properties of Cured Viton Rubber Compounds

(Sample press-cured for 1 hr at 300°F, followed by 18 hr at 400°F in oven)

Tensile strength (psi)	
At room temp	2000-3000
At 300°F	300-1000
Elongation (%)	
At room temp	100-400
At 300°F	80-200
Hardness (Durometer, Shore A)	60-95
Compression set (% recovery after 25% compression and holding 70 hr at 250°F)	90-97
Brittle point (0.075"-thick specimen, °F)	-47
Stiffening temperature (°F at which Young's modulus reaches 10,000 psi)	-20
Mold shrinkage (%)	2-2.5
Electrical properties	
Resistivity (ohm-cm DC)	2.5 x 10 ¹³
Specific inductive capacity	16.7
Power factor (%)	4.5
Dielectric strength (volts/mil)	412
Properties of uncured elastomer	
Color	Clear White
Specific gravity	1.85

Uses: In compounding oil-resistant rubber products for high-temperature applications. While at present, seals for military aircraft and missile uses loom as the most important use, commercial applications should outstrip military uses in the near future.

Here are some of the fields that could be investigated. This fluorine-based elastomer, called "Viton", can be used to compound highly resistant hoses, protective clothing, fuel cells, wire insulation, caulking, and paint. Products made from the elastomer can be used in industrial equipment and instruments for the chemical processing and automotive industries.

Specifically, one manufacturer of thermostatic controls has under development an instrument which utilizes the thermal expansion and contraction of a fluid as the sensing mechanism. The

fluid is contained in a rubber bellows. The higher the temperatures at which this bellows can operate, the higher the temperature at which the controller can be used, and thus the wider will be its usefulness. Product is a "natural" for this use.

A manufacturer of gasoline-pump meters hopes this elastomer will solve a problem caused by the recent introduction of super-octane (and highly aromatic) automotive fuels. Metering pumps and nozzles contain some close-tolerance rubber parts which come in contact with these fuels. Since almost no swell is permissible, less expensive elastomers are continuing to give trouble. This material has not.

A third example is valve stem seals on truck engines. Seals operate at temperatures in excess of 350°F. Conventional oil-resistant elastomers withstand the

oil, but not the heat. The seals harden and do not maintain a tight fit around the valve stem. The engine becomes "an oil burner" after a few thousand miles. Seals made of the fluorine elastomer should remain elastic indefinitely at these temperatures.

In manufacturing industrial rubber-covered rolls, compounds made of material should have increased life in high-temperature-forming rolls and in squeeze rolls exposed to active solvents like carbon disulfide.

Features: The most valuable properties of product are its exceptionally good performance at temperatures from 400 to 600°F; resistance to chemicals and to jet fuels, lubricants, and hydraulic fluids even at these high temperatures; and good mechanical properties such as resistance to compression set.

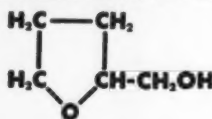
Product can be compounded to

CURIOSITY IS THE KEY TO PROGRESS

This curiosity is a knothole look at the potential. Why not let your curiosity be aroused to the potentiality of using tetrahydrofurfuryl alcohol in your products or processes?



YOU CAN PROFIT FROM CURIOSITY ABOUT QO® THFA



Curiosity about QO tetrahydrofurfuryl alcohol (THFA®) can be rewarding in many different ways to those who investigate it.

Tetrahydrofurfuryl alcohol is the starting point for such interesting compounds as dihydropyran, pyridine, glutaric acid, 4-hydroxyvaleraldehyde, 5-(2-tetrahydrofuryl) hydantoin.

Solvent uses of THFA have attracted much attention. Its high boiling point coupled with complete miscibility with water makes it unique. Its solvency for resins, gums, dyes and complex organic compounds is excellent.

Tetrahydrofurfuryl alcohol esters of 2,4-D and 2,4,5-T are powerful, low volatility brush and weed killers.

QO Tetrahydrofurfuryl alcohol is readily available, safe to handle and now lower in cost.

You can profit from curiosity about THFA. Bulletin 206, yours for the asking, gives you physical data, chemistry, uses and general information about this interesting chemical.

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Check 5487 opposite last page

CHEMICAL MATERIALS

have hot tensile and elongation equal to any elastomer, and better than most. Final compounds have excellent resistance to deterioration at high temperatures, and to ozone and weathering.

Compounding the elastomer with fillers, vulcanizing agents, and pigments is performed in the conventional way and on standard rubber working equipment. Compounded material can be molded, extruded, and calendered on standard machinery and without trouble. There is one difference however. Viton requires a high-temperature post cure: about 18 to 24 hours in a 400°F oven.

Description: Early in the development of Teflon fluorocarbon resin molding powders, dispersions, and finishes, it was found that certain fluorinated olefins were flexible. Following this lead led to the development of the new elastomer which now opens new fields for fluorine-containing compounds.

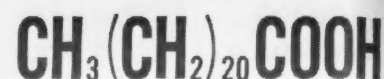
Chemically, elastomer is a linear polymer of hexafluoropropylene and vinylidene fluoride. It is about 65% fluorine (by wt) and has a specific gravity of 1.85.

When oven-aged in air, vulcanizates remain usefully elastic for more than 2400 hours at 400°F, 250 hours at 500°F, and over 24 hours at 600°F. After these times, it starts to get brittle, although tensile strength is largely unaffected.

In contact with chemicals, jet fuels, and high-temperature hydraulic fluids at temperatures of 400°F and up, material's resistance is unequalled by any other commercially available elastomer, even the silicone rubbers. The ketones (MEK and acetone) cause swelling. These are the recommended solvents for making solutions of unvulcanized Viton compounds.

Physical properties are shown in the table. Reduction of tensile and elongation at elevated temperatures is a reversible effect, and is not related to deterioration of the elastomer by continued exposure to heat.

Even at elevated tempera-



Can unique Behenic Acid also help solve your new product problems?

The pedigrees of several profitable new products now on the market include a little-known ADM product—Behenic Acid. Behenic is a saturated C-22 chain length fatty acid from natural fats or fatty oils commercially available. As far as we know, only ADM has it for sale.

When used in emulsions or solutions, Behenic Acid holds things together with the zeal of a marriage counselor. For example, it adds stability to certain products used in the



graphic arts industry. It serves nobly as an opacifying agent and stabilizer in such things as cream shampoos. And a recent discovery shows that Behenic Acid derivatives form wax-like esters with silicones, giving the cosmetics industry some intriguing new solid silicone products to tinker with instead of being restricted simply to liquids.

Behenic Acid is a white, waxy, almost odorless crystalline solid at room temperature. It can be esterified with fatty alcohols (we sell these, too) to produce high melting point waxes. In oil systems it prevents separation. Because Behenic Acid stabilizes emulsions, it is a good bet for soaps, lotions, cosmetics, lubricants, esters, chemical intermediates, and specialties. Behenic Acid may be able to help you develop interesting new products, too. There's only one way to find out. Ask us to send information and samples.

Archer-Daniels-Midland



CHEMICAL PRODUCTS DIVISION
742 Investors Building, Minneapolis, Minnesota

Chemifats from
Nature's Wondrous Warehouse

Check 5488 opposite last page

CHEMICAL PROCESSING

tures, stocks have good resistance to compression set. This is particularly important in mechanical rubber goods, especially in gaskets intended for high-temperature use.

Low-temperature properties of product are adequate for most services. Brittle point depends on specimen thickness — a cured sample 0.075" thick breaks at -47°F. A wire coating that's 0.010" thick does not crack until -90°F when bent around a mandrel that has a diameter ten times that of the wire.

The temperature at which a previously stretched and frozen specimen retracts 10% (known as the "T-10 value") is -250°F. This is the minimum temperature at which rubber-like properties are evident.

Compounds of elastomer are highly resistant to ozone and weather deterioration. Test strips, under 25% stretch, were exposed to 100 ppm ozone for 28 days and showed no signs of cracking. Stretched samples have been exposed to Florida sunlight for twelve months with no sign of cracking. (During this past winter, however, it also turned out to be something of a low-temperature test.)

Electrical properties (see table) restrict material to low-voltage, low-frequency applications. There has been considerable interest in this area, such as for insulation for hook-up wire exposed to dry heat and hot oil.

Elastomer has been in the testing stages for about two years. This spring, a commercial plant for producing the material has opened in Deepwater, New Jersey.

Price of the raw polymer is at \$15 a pound, which of course is reduced as the elastomer is compounded and made into a final product. Although higher by far than "conventional elastomers", price is competitive with many of the specialty elastomers.

(Viton is a product of Elastomers Dept., E.I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.)

Check 5489 opposite last page.

Send today for this useful data on PETROLATUMS prepared to fit your specific needs

Technical Data File P-300

PHARMACEUTICAL OINTMENTS—PETROLATUM FOR

Products: **Alba PROTOPET, White PROTOPET 15, Yellow PROTOPET 15 and PERFECTA Petrolatums U.S.P.**

Pharmaceutical Ointments:

Most ordinary pharmaceutical ointments employ either white or yellow petrolatum (U.S.P.) as the carrier for the therapeutic agent. In some cases where a large quantity of solid ingredients is added to the ointment, or where a softer consistency is desired, white mineral oils (U.S.P. or H.F.) are included in the formulation. (See Technical Data File P-2.)

Types of Petrolatum Available:

Type I—Alba PROTOPET, a U.S.P. petrolatum of medium melting point and of medium to soft consistency, is employed as the base for premium pharmaceutical ointments. **Alba PROTOPET 15** is of the highest color obtainable in U.S.P. petrolatum, indicating its optimum degree of refinement. It is thus particularly satisfactory for such quality ointments as ointment for skin eruptions, ointment and paste, leucic acid, ophthalmic, paraffin and waxy ointments.

PERFECTA is a U.S.P. petrolatum of high melting point and medium to soft consistency, is employed especially as a base for pharmaceutical ointments containing large quantities of liquid ingredients which would otherwise reduce the melting point of the finished product to an unduly low temperature. It is thus particularly satisfactory as an ointment base for finished products to be used in hot climates. **PERFECTA** is, however, of the highest color obtainable in U.S.P. petrolatum and is thus especially recommended for both superior ethical and proprietary pharmaceutical ointments.

Type II—White PROTOPET 15 or Yellow PROTOPET 15 U.S.P. petrolatum of medium melting point and medium to firm consistency, is employed as the base for the majority of pharmaceutical ointments, depending on the color of the finished product desired.

PROPERTIES ESSENTIAL FOR THE PURPOSES

PROPERTY	Alba PROTOPET	White PROTOPET 15	Yellow PROTOPET 15	PERFECTA
Softening Point (°F.)	115/120	115/120	115/120	125/130
ASTM Consistency	100/100	100/100	100/100	100/100
Color (maximum)	1.5 Y	1.5 Y	1.5 Y	1.5 Y
Acid	None	None	None	None
Alkali	None	None	None	None
Stability Test	Pass	Pass	Pass	Pass

*Type I—Alba PROTOPET 15 and Yellow PROTOPET 15 U.S.P. are 100% refined. Type II—White PROTOPET 15 and Yellow PROTOPET 15 U.S.P. are 100% refined. The following ointments, employing petrolatum in their formulation, are listed in the

Gives complete information on properties and characteristics of the Petrolatum best suited for utilization in each application or process listed below. Also suggested formulations.

Check Coupon Below for Data on PETROLATUMS for Use in These Applications.

1. Buffing Compounds
2. Butcher Paper
3. Carbon Paper
4. Concrete Curing Compound
5. Cosmetic Creams
6. Food Handling Machinery Rust Preventives
7. Food Processing
8. Hair Pressing Oil*

9. Hair Preparations**
10. Industrial Protective Creams
11. Industrial Putties
12. Leather Industry
13. Modeling Clay
14. Paper Impregnation (Carrier for Polyethylene)
15. Pharmaceutical Ointments
16. Printing Inks

17. Rubber Products
18. Rust Preventives
19. Slab Dressing for Confectionery Industry
20. Soldering Fluxes
21. Sweeping Compounds
22. Twister Ring Lubricants
23. Veterinary Ointments and Medications

*Special High Smoke Point Mineral Jelly
**Including Butch Cream or Hair Stick

White Oil, Petrolatum & Sulfonate Div., Dept. CP68
L. SONNEBORN SONS, INC.
300 Fourth Avenue, New York 10, N.Y.
Please send me the Technical Data indicated below (circle number corresponding to application in list above).

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23

Name

Title

Company

Address

City Zone State

Sonneborn

L. SONNEBORN SONS, INC.
New York 10, N. Y.

Specialists in White Oil and Petrolatums for More than
Half a Century

Check 5490 opposite last page

CHEMICAL MATERIALS

Polyethylene materials on Ziegler catalysts

Low-pressure polyethylene is being produced at company's new fully automated plant. Based on Ziegler-type catalysis, the annual rate of production will be 30,000,000 pounds.

According to manufacturer, these high-density polyethylene materials possess a valuable combination of properties: stiffness, low permeability, high service temperature, and freedom from distortion. This enables plastic to serve fabricators better in such areas as sterilizable bottles, large moldings, coated paper for packaging, closures, and toys.

Resins are in a density range to 0.95. They've been under test for over a year.

(Low-pressure polyethylene is product of Bakelite Co., Div. of Union Carbide Corp., 655 Madison Ave., New York 21, New York.)

Check 5491 opposite last page.

Boron phosphate

Boron phosphate can be used in ceramic glazes and in vitreous (or porcelain) enamels. It can be introduced into frits and used as a mill addition. It will catalyze certain organic reactions.

Specific gravity of BPO₄ is 2.81. Melting point of the fine, white crystalline solid is above 1400°C.

(Boron phosphate is a product of Pacific Coast Borax Company Division, United States Borax & Chemical Corp., 100 Park Ave., New York 17, N. Y.)

Check 5492 opposite last page.

Hydrous alumina silicate

Chemical and physical properties, compatibilities, dehydration reactions, and particle size distribution of hydrous alumina silicates are in eight-page Bul 1257 — Summit Mining Corp., Carlisle, Pa.

Check 5493 opposite last page.

MIN CHEM

...news briefs

ON THE CREATIVE USE OF
M & C PROCESS MATERIALS

*Papermakers: M & C makes over 1,000 tests per day to assure you highest quality Edgar Clays

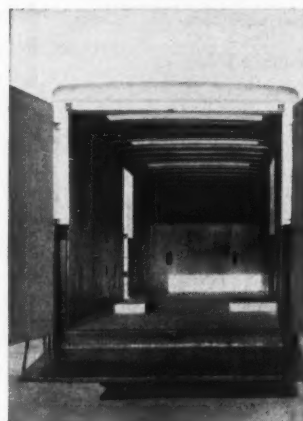
Fact: More than a thousand individual quality control tests are made on Edgar Paper Clays each day in M & C mines and plants. That's the extent to which M & C goes to produce clays of outstanding high quality and uniformity. Illustrations show typical quality control checks—tests to insure M & C Edgar Clays meeting specifications for brightness, gloss, color shade, viscosity, moisture, etc. As a final check, samples are taken from each car—no shipment is allowed to move unless it meets both M & C and customers' standards. This is a starred item. Use the coupon.

Testing begins with prospecting... cores
must measure up to strict specifications



ASP-filled Reinforced Plastic

van floor resists slams, bangs, scrapes—
saves 1,500 pounds in weight



Floors of moving vans must have superior impact strength and abrasion resistance to take the rough, tough treatment of long distance hauling. Van pictured uses fibreglas reinforced epoxy and polyester resins with high loadings of ASP 400—M & C's Aluminum Silicate Pigment filler—to make the floor and roof panels. Result: great toughness and weight savings of about 1,500 pounds per truck body. ASP fillers also permit ease of formulation, long pot life, excellent characteristics.

Outside House Paints—

made with ASP extenders—back
durability with 6-year test

This painter knows how the job will stand up—and the paint manufacturer does too, thanks to M & C's long term test fence studies. You can't simulate all the vagaries of weather in laboratory tests—only actual exposure over a long period of time gives positive answers. Final tabulated results after 6 years of observation show M & C Aluminum Silicate Pigments in outside house paints contribute to excellent exposure ratings, superior brushing characteristics and low cost... detailed 12-page bulletin and supplement tells all. Use the coupon for a copy.



MINERALS &

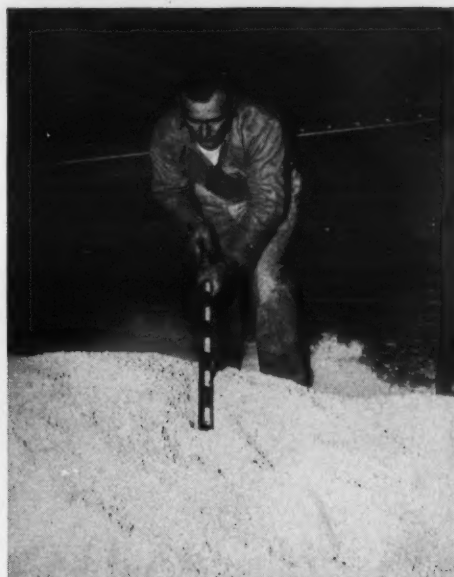
CORPORATION OF AMERICA

Leaders in creative use of non-metallic minerals



▲ Mine-site laboratory where brightness, residue and viscosity are under hour-by-hour test

▶ Examination of viscosity charts from high shear viscometer at plant control laboratory



▲ Final test of a loaded car — no car rolls without a control laboratory OK

CHEMICAL MATERIALS

Strength quadrupled in bonding vinyls to nylon, Dacron

Uses: For bonding vinyl compounds to fabrics of nylon or Dacron polyester fiber.

Features: Product has shown bonding results in as high as four times the strength of conventional adhesives.

Description: Adhesive is a mixture of commercially available ingredients. Shelf life of adhesive-coated fabric is good with no appreciable loss of bond strength after 45 days. Current average bond strength is 5 lb/in; often attains 20 lb/in.

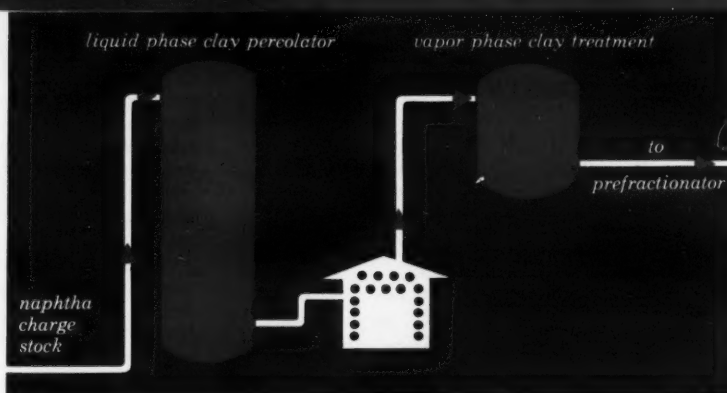
(NVD adhesive is product of B.B. Chemical Co., Cambridge, Mass.)

(Information is available from Textile Fibers Dept., E.I. du Pont de Nemours & Company, Wilmington 98, Del.)

Check 5495 opposite last page.

Platinum Catalysts protected against poisonous compounds with Attapulugus Clay adsorbents

Flow diagram shows reformer feed stock passing through Attapulugus Clay-packed "guard case" equipment where troublemaking constituents are removed by selective adsorption and catalysis. Some poisons need only be present at 10 parts per billion to permanently foul the catalysts. Low investment and prompt payout in terms of optimum production rate characterize this protective treating operation... poisons removed include Arsenic, Nitrogen, Tetraethyl Lead and Alkyl Sulfur compounds.



Commercial production of lithium perchlorate

Commercial production of lithium perchlorate has been announced. An important oxidizing agent, lithium perchlorate (LiClO_4) contains more available oxygen than liquid oxygen itself.

It is a stable, easily handled solid containing 91 lb of oxygen per cubic ft. At temperatures above 430°C , it decomposes rapidly to liberate oxygen, with lithium chloride as the residue.

(Lithium perchlorate is available from Lithium Corp. of America, Inc., 2500 Rand Tower, Minneapolis, Minn.)

Check 5496 opposite last page.

Staple fiber cellulose

Versatile chemical cellulose for staple fiber is told of in four-page bulletin. Has unique advantages. "Rayofiber" Bul — Rayonier Incorporated, 161 E. 42nd St., New York 17, N.Y.

Check 5497 opposite last page.

Use this quick two-check coupon ▶

- ✓ your product interest...
- ✓ what you need to get tests started... we'll fill your requests immediately.

For more data, see your Chemical Materials Catalog Pages 358-362

CHEMICALS

6460 Essex Turnpike, Menlo Park, New Jersey

Export Department: Room 150, Garden State Parkway, Menlo Park, N.J. (Cable Address: "MINCHEM")

• MINERALS & CHEMICALS CORPORATION OF AMERICA
• 6460 Essex Turnpike, Menlo Park, N.J.
• I'm interested in:
• ☐ Paper Clays ☐ Outside House Paint extender
• ☐ Reinforced Plastic filler ☐ Platinum Catalyst protection
• Please send, without obligation:
• ☐ data; ☐ samples; ☐ prices; ☐ technical representative
• name _____
• title _____
• company _____
• address _____
• city _____ zone _____ state _____

Check 5494 opposite last page

FOR MICROBIOLOGICAL CONTROL

TRIS NITRO

Investigate Tris(hydroxymethyl)nitromethane!
Inhibits growth of bacterial flora in cutting oils. Dramatically checks unwanted microbiological growth in aqueous systems. Effective in protecting recirculating water systems, cooling towers, and oil well flooding operations. Prevents deterioration of non-protein sizing and adhesive solutions during storage.

PROPERTIES TRIS NITRO (CH₂OH)₃CNO₂
Molecular Weight 151.12
Melting Point °C, approx. 175-176
pH of 0.1M Aqueous Solution at 20°C 4.5
Solubility in water, g/100 ml at 20°C 220
Very soluble in alcohols,
sparingly soluble in hydrocarbons

CSC CHEMICALS FOR INDUSTRY

ALCOHOLS

Methanol Butanol
Ethyl Alcohol

AMINES AND AMMONIA

Ammonia, Anhydrous and Aqua
Ammonium Nitrate, Solid and 83% Sol.
Methylamines
Benzyltrimethylammonium Chloride
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ESTERS

Amyl Acetate Butyl Acetate
Butyl Lactate Butyl Stearate
Dibutyl Phthalate Ethyl Acetate
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NITROPARAFFINS

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Nitromethane 1-Nitropropane
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Bacitracin Cycloserine
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NEWARK, N. J. • NEW ORLEANS, LA. • PHILADELPHIA, PA. • PITTSBURGH, PA. • PORTLAND, ORE.
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COMSOLMEX, S.A., MEXICO 7, D.F. • IN CANADA: McARTHUR CHEMICAL CO., MONTREAL, QUE.



CHEMICAL MATERIALS



Empirical formula for copper hydrate complex —
4.5% (by wt) of phosphate is key to stability

Copper hydrate complex combines high toxicity and stability

Half-micron particle size makes it a natural for
anti-fouling coatings, catalytic applications

Uses: Two fields show particular promise for this stable copper hydrate complex: toxic uses and catalytic uses.

As an active toxic ingredient, copper complex will find use in paints having antifouling, antiseptic, and anti-mildew properties; in dry formulations for plant dusting; in aqueous sprays for plants or surfaces susceptible to fungus attacks, where a non-permanent coating is desired; as ingredient in wood preservatives; as a mildew-inhibiting ingredient in concrete and plasters; and in rodenticides.

Catalytic uses should be investigated because of the small particle size and the high copper content of the complex.

It also may find use as an intermediate to make fine copper powder for catalysts, in chemical syntheses, or metallurgical applications.

Features: Not only is this copper hydrate complex highly toxic to both marine organisms and to warm-blooded vertebrates, but because of its chemical make-up it is more stable than conventional copper hydrates both in air and aqueous suspensions.

Due to its extremely small particle size, about ½ micron, complex is easily incorporated into protective anti-fouling coatings. When placed in ammoniacal solution, complex reacts chemically with cellulose,

very rapidly and very completely.

Description: Copper Hydrate Complex — Type I is a fine light-blue powder containing minimum of 58% copper. Its peculiar structure has been obtained by incorporating phosphorous into the molecule, the approximate empirical formula of which is illustrated. Phosphate content is 4.5% (max). Free-water content is less than 3.0%. Bulk density of firmly tamped material is 0.46 gm/cc.

Toxicity

Toxicity tests on barnacles (*balanus balanoides*) compared the hydrate complex with a grade of cuprous oxide used in anti-fouling paints. Although the hydrate complex contains less copper per unit weight, it seems to be more toxic. A concentration of 1.0 ppm of hydrate complex is 100% active against this species after 24 hours, compared to a 60-80% survival in cuprous oxide under the same conditions.

Marine paint tests run near Miami, Florida, showed that paints formulated properly for the hydrate complex provide durable underwater finishes that have better inhibition of growth of seed barnacles into mature organisms than do certain standard cuprous oxide formulations.

Check 5498 opposite last page

Tests on effectiveness against diatoms found on surfaces exposed to sea water (prior to occupation by barnacles) showed that the hydrate complex and cuprous oxide are of the same order of toxicity, and more toxic than a commercial grade of copper hydroxide.

Against snails (molluscs), hydrate complex (in concentration equivalent to 1.0 ppm Cu) gives a mean survival time of 60 hours in hard water (180 ppm as CaCO_3). In presence of this same amount of copper either in the form of copper sulfate or copper ammonium fluoride, mean survival time is greater than 72 hours in hard water (200 ppm as CaCO_3).

With warm-blooded vertebrates, tests show that on a weight basis the hydrate is more toxic than copper sulfate. Oral LD_{50} (to English guinea pigs) is 9.6 mg Cu/kg body weight. On mice, a dose of 0.05 mg/kg induced 100% fatality, while 25.0 mg/kg gave only 13% fatality. It's clear that the complex must be handled with care and the dust must not be inhaled.

(Dy-Q-Plex [Copper Hydrate Complex] is a product of Henry Bower Chemical Manufacturing Co., 2815 Gray's Ferry Rd., Philadelphia 46, Pennsylvania.)

Check 5499 opposite last page.

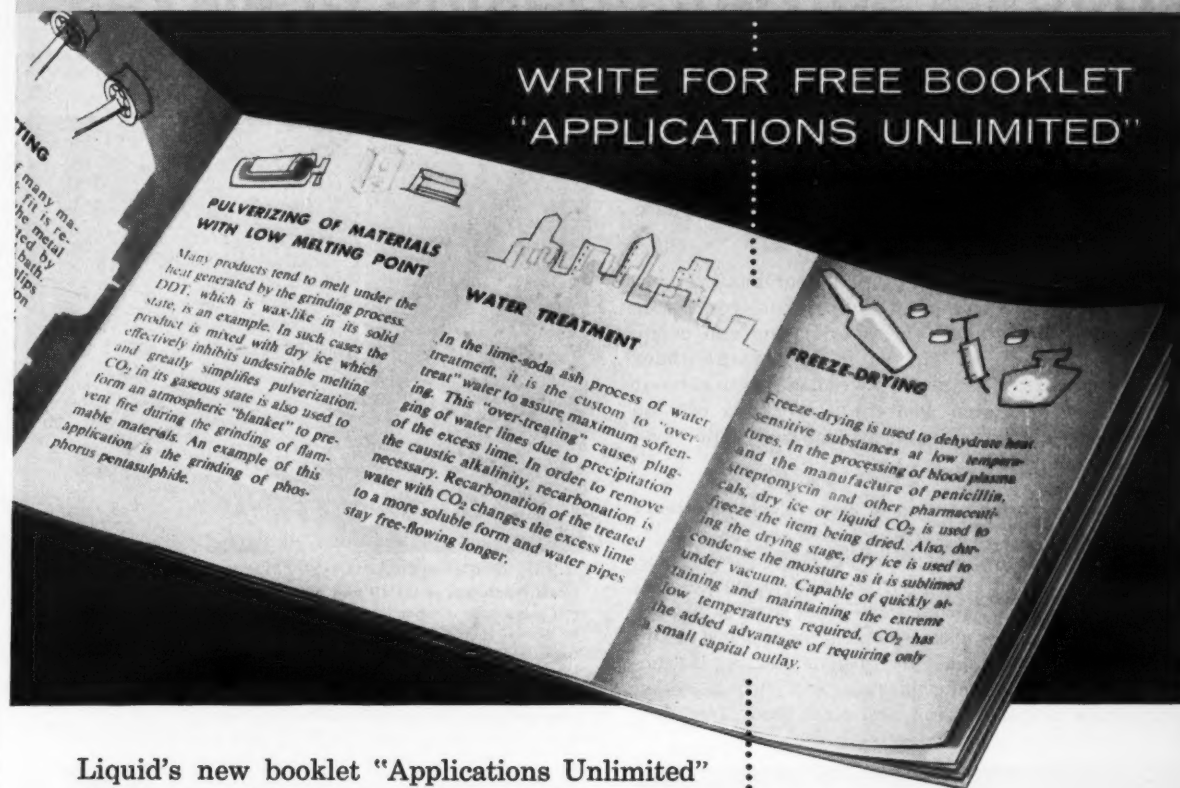


"You need a shipment of chemicals by tomorrow? Guess again, brother!"

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Aircraft	Foundry Cores	Paint Packaging
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Animal Husbandry	Precision Casting	Pie Crust Mixes
Aspirin	Generator Purging	Polyester Fibers
Beverages	Grinding Coolant	Pulverization
Carbonates	Hog Slaughtering	Rubber Tumbling
Cooling of Reaction Kettles	T.I.G. Welding	Frozen Foods
Dining Car Refrigeration	Inerting	Shrink Fitting
Electronic Tubes	Instant Coffee	Sponge Rubber
Fire Prevention	Laboratory Use	Textile Manufacturing
Food Packaging	Leather Treating	Water Purification
	Steel Hardening	Water Treatment
	Paint and Varnish	White Lead

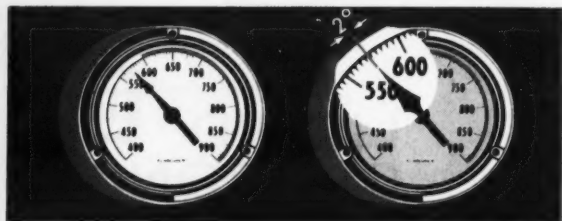
Check 5500 opposite last page

Now, firesafe Aroclor "liquid heating" boosts solvent cooking of alkyds

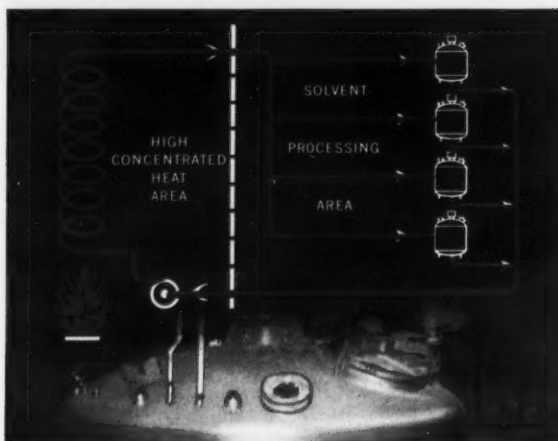
Now alkyd resin makers are reaping the full advantages of solvent cooking and improvements in fusion processing to get more uniform polymer distribution, batch after batch, using Aroclor 1248 liquid-phase heat transfer!

Problems in solvent cooking . . . Direct heating systems often do not give good temperature control or even heat—"hot spots" and overheating can occur easily. High concentrated heat or open flame under the cooking kettles are obvious fire hazards in solvent processes. Flammable heat-transfer fluids can be another threat to firesafety. Pressurized vapor systems are expensive.

Aroclor liquid-phase heating is firesafe and relatively inexpensive . . . Cooking temperatures are easily regulated—alkyds achieve consistently good hardness, color, drying times and other important film properties. Indirect heating with Aroclor 1248 gives sure, safe, even temperatures best for many chemical processes: dyestuff synthesis and other chemical reactions; heating bituminous materials; molding plastics and curing rubber compounds; deep-fat frying, and other food processing.

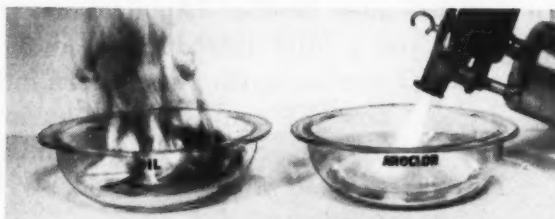


Transfers heat efficiently up to 600°F.—gives even temperatures easily controlled to within 2°F. Aroclor 1248 liquid is a highly stable chlorinated polyphenyl—won't pit or corrode metals—flows freely like water, above 300°F.—operates in most systems four to seven years without replacement.



Alkyd kettle: courtesy The Glidden Company

Costs much less to install and maintain than pressurized systems—non-pressurized Aroclor liquid heating cooks alkyd resins at 400-490°F. or higher. Simple forced circulation requires no condensers, vaporizers, traps, heavy-walled jackets or complex feed mechanisms for the Aroclor heating system. Compact designs save space. Equipment ranges from small portable units—usually electrically heated—to large gas- or oil-fired units generating up to 20,000,000 BTU's per hour.



A blowtorch won't ignite Aroclor 1248. Fire-resistant Aroclor increases safety—eliminates flammable heat-transfer fluids and direct firing—does not support combustion up to its boiling range, 652-725°F.—operates within a closed system vented to the atmosphere.

Aroclor: T. M. Monsanto Chemical Company

Use coupon for Aroclor engineering data—experienced sources of heating systems—



WHERE CREATIVE CHEMISTRY
WORKS WONDERS FOR YOU

Monsanto Chemical Company
Organic Chemicals Division
Department IF
St. Louis 24, Missouri

Please send: ☐ Technical information about Aroclor 1248
☐ Names of designers and manufacturers of equipment for Aroclor 1248

Name.....
Company..... Address.....
City..... Zone..... State.....

CHEMICAL MATERIALS

Increased toughness marks high-density polyethylene

Uses: For large fabricated parts and for many filament applications.

Features: Compared with conventional materials, product has increased toughness, greater environmental stress-cracking resistance, higher melt viscosity, and an improvement in "creep" properties. Vacuum-formed parts can be made in large sizes, and will be tough, temperature resistant, and attractive.

Description: Extrusion-grade polyethylene resin is available in commercial quantities. Its high melt strength during sheet extrusion and calendering minimizes sag during subsequent vacuum forming and gives a uniform thickness to the finished parts.

(Marlex Type 2 is product of Phillips Chemical Co., Bartlesville, Okla.)

Check 5502 opposite last page.

Vinyl acetate/stearate and polyvinyl stearate for coatings, polishes

Polyvinyl acetate/stearate beads (D-13), a copolymer of vinyl acetate and vinyl stearate, suggests use in formulation of paper coatings, adhesives, ink, chewing gum, and other specialty products. Films are clear, transparent, greaseproof, non-toxic, permanently flexible, heat-sealable, and have good adhesion to most surfaces.

Polyvinyl stearate beads (D-108) have physical and chemical properties similar to waxes. However, unlike many natural and synthetic waxes, material has a sharp melting point and very narrow softening range. Polishes and coatings containing the beads form water-insensitive films which have a high gloss.

(Beads are available in experimental quantities from Colton Chemical Co., a Div. of Air Reduction Co., Inc., 1747 Chester Ave., Cleveland 14, Ohio.)

Check 5503 opposite last page.

Check 5501 opposite last page

**Make silicone rubber
sponge components
to close tolerance**

Firm and medium closed-cell silicone rubber sponge can be made to close tolerances, using two compounds recently made available. Both meet AMS specs, are usable at temp ranging from -120 to +500°F. (SE-546 and -547 are products of Silicone Products Dept., General Electric Co., Waterford, New York.)

Check 5504 opposite last page.

**Superior heat stability,
good color, clarity
with PVC resin**

Uses: For vinyl extrusion.

Features: Processing advantages include: dust-free handling, extremely fast dry-blend flow properties, very fast banding on a mill, and faster extrusion rates. Heat stability of the resin is outstanding. Gel count is very low, and it has excellent color and clarity.

Description: Series of vinyl resins is characterized by a large, uniform particle size, and complete freedom from fines. Resins have capacity to absorb large amounts of plasticizer and still yield uniform and free-flowing dry blends.

Series of resins are available in four molecular weights.

(For further information on resin series, contact Escambia Chemical Corp., 261 Madison Ave., New York 16, N.Y.)

Check 5505 opposite last page.

Insecticide bulletin

Handy six-page brochure describes new organic phosphate insecticide, a non-systemic, long-residual compound which is also an efficient miticide. Brochure indicates tolerances so far established, residual activity, and toxicology. The four formulations available are described. "Tri-thion" — Stauffer Chemical Co., 380 Madison Ave., New York 17, N.Y.

Check 5506 opposite last page.

New low-melt polyethylene...

Epolene C

Epolene C, a new type of polyethylene, possesses many of the properties generally associated with plastic grade resins and yet can be handled much like a moderate to high melting point wax.

Because of its wax-like characteristics, Epolene C can be handled as a melt, with or without modification. At 300°F, for instance, the viscosity of the new resin is 8,000 centipoises. The addition of 25% paraffin, with which it is completely compatible, reduces the viscosity to only 1,300 centipoises at this temperature.

The pourability of Epolene C at moderate temperatures points the way to new product opportunities and low-cost production techniques in the manufacture of toys, novelties, art objects and reproductions, housewares or any product capable of being formed by slush or rotational molding or casting.

With Epolene C, paper converters can use wax-coating machines, modified to operate at somewhat higher temperatures, to apply polyethylene directly to paper sheets or web.

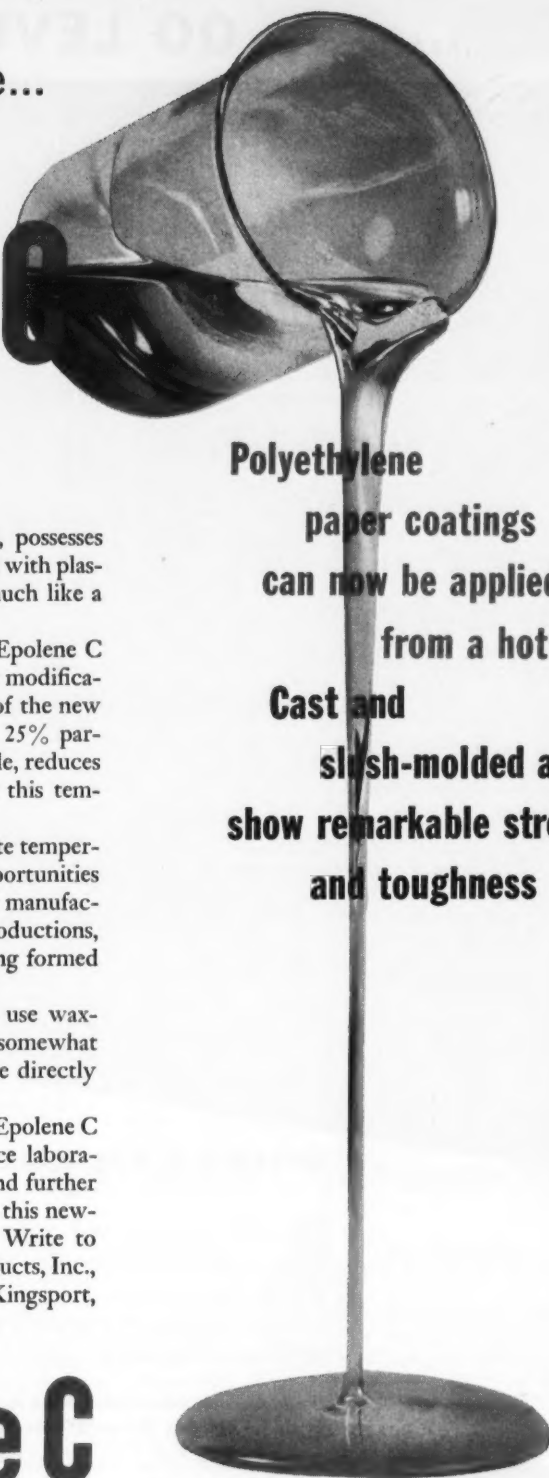
Investigation of these and other uses for Epolene C is continuing at Eastman's customer service laboratories. We will be glad to supply samples and further information and to assist you in evaluating this newest addition to the polyethylene family. Write to Chemical Division, Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tennessee.

Epolene C

EASTMAN LOW-MELT POLYETHYLENE

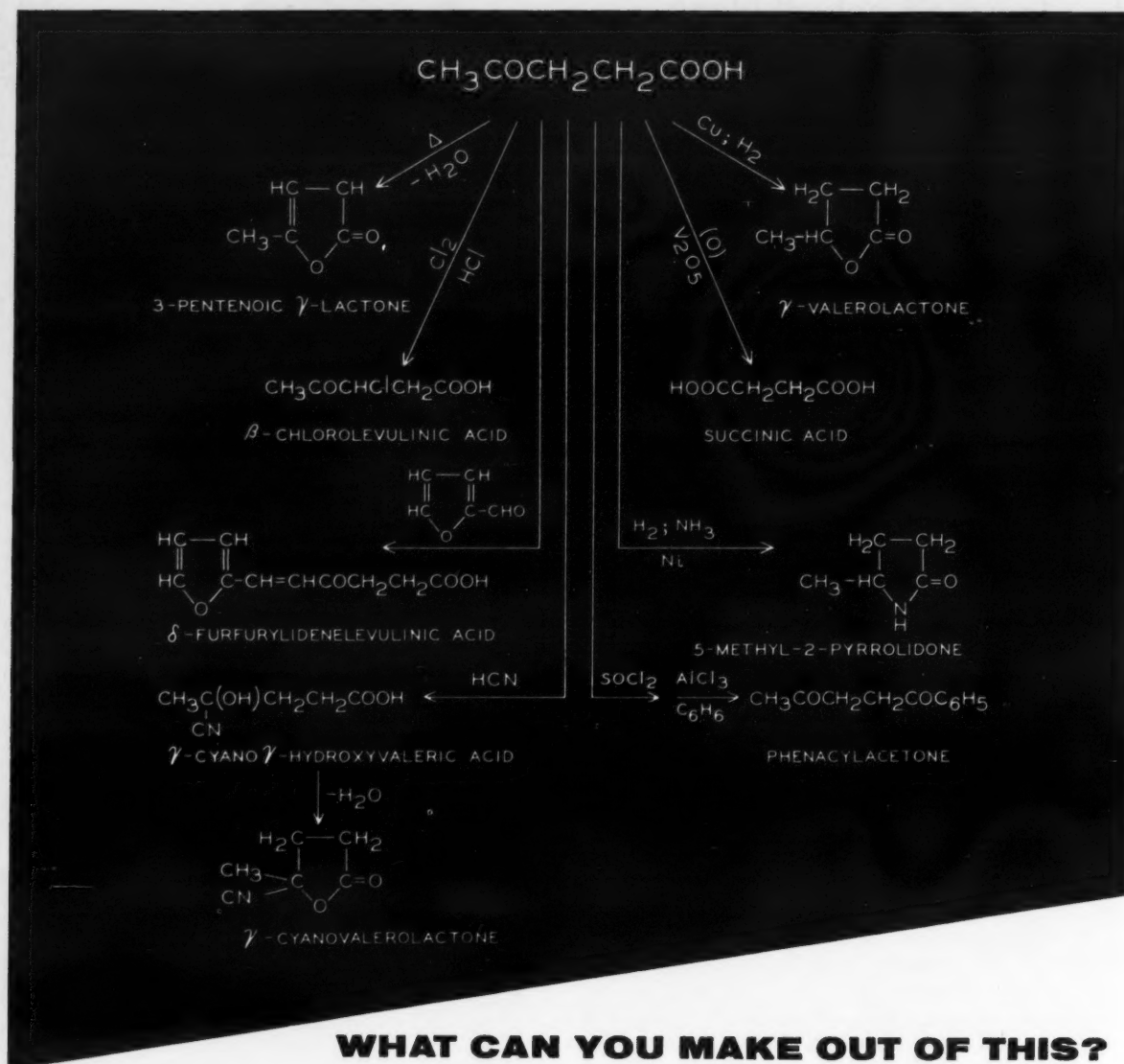
SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cleveland; Cincinnati; Chicago; St. Louis; Houston. **West Coast:** Wilson Meyer Co., San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

Check 5507 opposite last page



**Polyethylene
paper coatings
can now be applied
from a hot melt
Cast and
slush-molded articles
show remarkable strength
and toughness**

SOME REACTIONS OF QO LEVULINIC ACID



WHAT CAN YOU MAKE OUT OF THIS?

This is QO Levulinic Acid, a particularly interesting chemical with polyfunctional characteristics. For example—it acts both as a carboxylic acid and as a ketone. The hydrogen atoms have various degrees of activity. Reactions are possible on the beta or delta carbon and in some instances on the alpha carbon. It cyclizes to heterocyclic forms.

It can be well worth your while to look into QO Levulinic Acid. Write for Bulletin 301 on QO Levulinic Acid and a sample.



The Quaker Oats Company CHEMICALS DEPARTMENT

336X The Merchandise Mart, Chicago 54, Illinois
Room 536X, 120 Wall Street, New York 5, New York
Room 436X, 48 S. E. Hawthorne Blvd., Portland 14, Oregon
Room 6156X, 815 Superior Ave., Cleveland 14, Ohio

Check 5508 opposite last page

CHEMICAL MATERIALS

Spray-dried emulsion — dextrin-compatible, borax-tolerable

Uses: Product is suggested for applications in adhesives.

Features: Dextrin compatibility and borax-tolerance of emulsion give numerous advantages. It can be used in envelope adhesives for the preparation of high-solids, low-viscosity, fast-drying gums. The product can also be used with borated dextrans in case- and carton-sealing adhesives.

Description: Dextrin-compatible spray-dried polyvinyl acetate emulsion, called D 702, can be blended, stored, shipped, and used in combined dry form with dextrans. When the dry mixture is added to hot or cold water, the resin redisperses rapidly as the dextrin dissolves, yielding a product similar to that obtained when dextrin is added to a dextrin-compatible polyvinyl acetate emulsion.

(Resin D-702 is a product of Dept. 30, Shawinigan Resins Corp., Springfield, Mass.)

Check 5509 opposite last page.

Acetyl peroxide — 25% in dimethyl phthalate

Adding to its line of organic peroxides, manufacturer is now supplying acetyl peroxide in the form of a 25% solution in dimethyl phthalate. Process is licensed from Beco Chemical Div. of Food Machinery and Chemical Corp.

(Acetyl peroxide is being manufactured by Lucidol Div., Wallace & Tiernan, Inc., Geneseo, N.Y.)

Check 5510 opposite last page.

Lithium facts, figures

Up-to-date facts and figures on lithium and other alkali metals (cesium and rubidium) are in 24-page brochure. Lithium—Montgary Explorations Ltd., Toronto, Ontario, Canada.

Check 5511 opposite last page.

Mono Stearates Di

of
Diglycol
Ethylene Glycol
Diethylene Glycol
Polyethylene Glycol
Propylene Glycol
Polyoxyethylene
Butoxyethyl
Glycerine

MADE TO MEET YOUR SPECIFICATIONS



THE FLAME AND THE FLASK—SYMBOL OF QUALITY

The C.P. Hall Co.
CHEMICAL MANUFACTURERS

5142 W. 67th Street, Chicago 38, Illinois
AKRON, OHIO • NEWARK, N. J.
CHICAGO, ILL. • LOS ANGELES, CAL.

Check 5512 opposite last page

CHEMICAL MATERIALS

**Lengthens storage life
in casting, laminating
of resin formulations**

Uses: For plastics and chemical industry applications.

Features: Tests indicate product lengthens storage life of aliphatic or aromatic epoxy resin formulations, used in casting or laminating. As a saturated acid anhydride, the product will undergo most of the usual anhydride chemical reactions, including hydrolysis, amidation, reduction, the Friedel-Crafts reaction, the Grignard reaction, and esterification.

Description: Low melting point of methyl succinic anhydride (37°C) permits mixing of epoxy resin formulations at room temperature or slightly higher. Clarity and light color are characteristics of epoxy resin castings cured with the anhydride.

(Methyl succinic anhydride is available in research quantities from Commercial Development Division, Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.)

Check 5513 opposite last page.

**Produces water-resistant,
very small particle-size
polyvinyl acetates**

Semi-commercial quantities of two water-resistant, extremely small particle-size polyvinyl acetate emulsions are now available for interior topcoat paints, primer sealers, and exterior masonry paints.

Elvacet 1423 is a copolymer emulsion which may be used without adding a plasticizing agent.

Elvacet 1440, a homopolymer emulsion, requires a plasticizer to give flexibility, but gives manufacturer wide choice in its selection.

Other expected uses: in adhesives, textile, and paper industries.

(PVA emulsions are products of Electrochemicals Dept., E.I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.)

Check 5514 opposite last page.

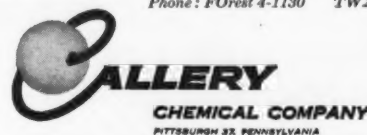
**... a mildly alkaline solid;
intermediate, catalyst,
corrosion inhibitor—**

SODIUM METHYL CARBONATE

Sodium Methyl Carbonate, CH_3OCOONa , is practically insoluble in many organic liquids, but is remarkably soluble in ethylene glycol and in glycerine. A relatively unknown and unexplored compound, it has an unusual combination of organic and inorganic properties.

Applications research on Sodium Methyl Carbonate continues at our laboratories. Some present and potential uses are: as an intermediate for preparing salicylates, ethylene carbonate, and benzyl carbonates; to neutralize weak acids; as a carbon dioxide source; to catalyze the alcoholysis of polyvinyl esters and glycerides; and to inhibit corrosion of anti-freeze cans. Write for Technical Bulletin C-910.

Phone: FOrest 4-1130 TWX: 117 Perryville, Pa.



Check 5515 opposite last page

**Pleasing Odor = More Sales
consider resodors*!**

RUBBER

PLASTICS

A soft talc odor helps sell baby pants. A soap-fresh fragrance adds buy-appeal to shower curtains. Hand bags with a simulated leather odor have a real competitive advantage.

Perhaps an appealing odor—or freedom from objectionable odor—is just what your product needs!

SINDAR can give you expert assistance. Our RESODORS were specifically



developed for use in plastics and rubber. They are easy to use—just add the oil at any convenient point in your process. They'll stand up under your temperatures too.

There's a RESODOR to give your product exactly the right odor appeal. May we send you samples and put our experience to work for you?

*Reg. U.S. Pat. Off.

SINDAR Corporation
Industrial Aromatics and Chemicals

321 West 44th Street • New York 36, New York

Check 5516 opposite last page

2

M&T TIN TETRACHLORIDE



*...silent salesman
for repeat business*

A cake of soap... delicately scented, subtly tinted, beautifully packaged and forcefully advertised to sell her on *one* brand. Will she buy it again?

Keeping her sold is often a job for an unseen chemical such as M & T Tin Tetrachloride—the scent and color stabilizer specified by leading soap manufacturers. To assure the quality that means repetitive business in other fields, M&T Tin Tetrachloride is also used as a chemical intermediate; for electroconductive coatings on glass, ceramics and mica; and in silk weighting. Other possible uses are in the refining of mineral oils and as a catalyst.

AVAILABLE AS LIQUID OR SOLID

Anhydrous M&T Tin Tetrachloride is a colorless liquid, miscible with water and a number of organic solvents. Also available is a white solid hydrate, M&T Tin Tetrachloride Pentahydrate. Both are exceptionally pure. Our technical staff will be glad to cooperate in applying either, or any other M & T chemicals to current or new uses.

GET DATA ON THE COMPLETE M & T CHEMICAL LINE

Metal & Thermit offers a wide line of commercial chemicals for further research or direct application. For more information consult our insert in Chemical Materials Catalog, or write us for a copy of booklet C-57.

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

METAL & THERMIT — UNITED CHROMIUM OF CANADA, LIMITED
BEXDALE, ONT.

INORGANIC TIN CHEMICALS

ORGANOTIN CHEMICALS

ORGANOMETALLIC CHEMICALS

ZIRCONIUM CHEMICALS

ANTIMONY CHEMICALS

PLATING CHEMICALS & PROCESSES

METALS & ALLOYS

MINERALS & ORES



Check 5517 opposite last page

CHEMICAL MATERIALS

Improve kraft papers with pregelatinized starches

Uses: As beater additive in making kraft and higher grade papers.

Features: Starch improves Mullen, tensile, tear, fold, pick and scuff resistance of the sheet.

Starch won't disintegrate or lose binding power through severe mechanical treatment.

Description: Arojel P is a potato-starch-derivative. It has a large gelatinous cell structure. Usual amount needed on Fourdrinier papers is about ½ to 2% (on dry wt).

(Pregelatinized starch is a product of Haberland Div., Morningstar-Paisley, Inc., 630 W. 51st St., New York 19, New York.)

Check 5518 opposite last page.

Phenolic products

Illustrated 12-page catalog describes phenolic resins, varnishes, and molding powders. Cat CDC-344 — Chemical Materials Dept., General Electric Co., 1 Plastics Ave., Pittsfield, Mass.

Check 5519 opposite last page.

For polyurethane foams, this silicone additive is easily dispersible

Uses: For flexible polyurethane foams.

Features: Additive may be easily dispersed into wide variety of commonly used catalysts. Final foams incorporating additive have smaller, even cell structure, uniform resilience and flexibility, and greatly improved appearance.

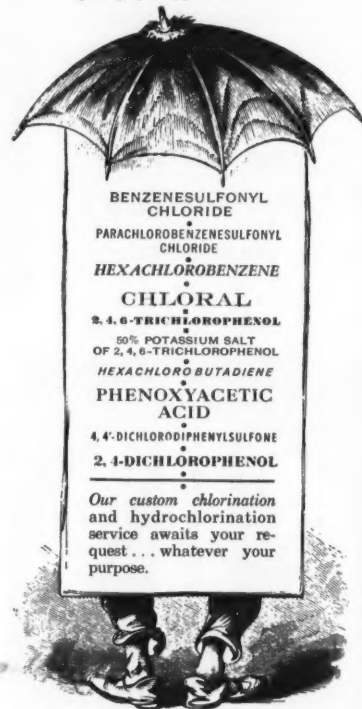
Description: A 50% oil-in-water emulsion of silicone fluid, additive will remain uniformly dispersed for as long as two weeks. Only one part per hundred parts of prepolymer is required for most flexible foams.

(EF-4527 silicone additive is product of Dow Corning Corp., Midland, Mich.)

Check 5520 opposite last page.



Hear Ye! Hear Ye! These ten organic intermediates are now available to you... twice as many as before! All of excellent quality... amply available... promptly shipped.



BENZENESULFONYL
CHLORIDE
PARACHLOROBENZENESULFONYL
CHLORIDE
HEXACHLORO BENZENE
CHLORAL
2,4,6-TRICHLOROPHENOL
50% POTASSIUM SALT
OF 2,4,6-TRICHLOROPHENOL
HEXACHLORO BUTADIENE
PHENOXYACETIC
ACID
4,4'-DICHLORODIPHENYLSULFONE
2,4-DICHLOROPHENOL

Our custom chlorination
and hydrochlorination
service awaits your re-
quest... whatever your
purpose.



Diamond Chemicals

DIAMOND ALKALI COMPANY
Union Commerce Building
Cleveland 14, Ohio

Check 5521 opposite last page

CHEMICAL PROCESSING

**Reportedly Innocuous,
glutamic acid lactam
has 98-99% purity**

Uses: Potential as intermediate for pharmaceutical and other industries. It is also useful in resolving racemic mixtures of amines to their optically active isomers.

Features: Said to be innocuous, material has purity of 98-99%, and very high water solubility.

Description: This lactam of glutamic acid, available as a white crystalline powder, is offered in pilot plant quantities. This heterocyclic amino acid has two reactive positions: a carboxyl group, and a cyclic amide group.

Glutamic acid is the only known substance, other than glucose, that can be utilized by the brain as an energy source. This lactam has been effectively used as a substitute for glutamic acid in amino acid mixtures ingested either orally or parenterally.

(Pyroglutamic acid is available from Central Research Laboratories, General Mills, Inc., 2010 East Hennepin Ave., Minneapolis 13, Minn.)

Check 5522 opposite last page.

**Yields dilute solutions
having high viscosity
for textile printing**

Synthetic-resin gum is more economical

Uses: For all printing and thickening applications in the textile industry.

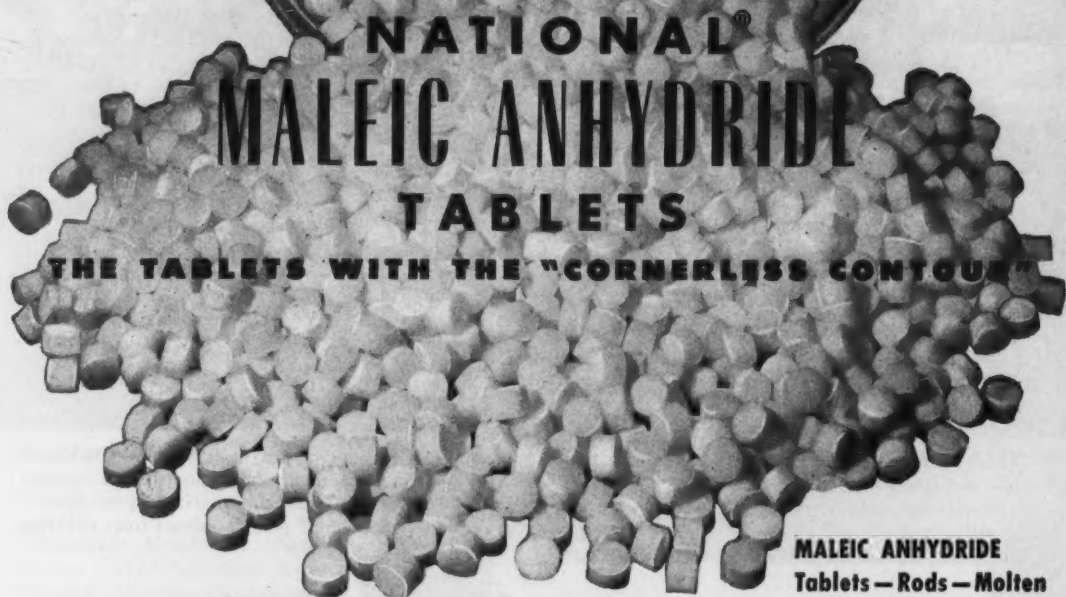
Features: Gum dissolves readily to yield dilute solutions of high viscosity recommended for pastes for screen and roller printing. It is low in cost compared to natural gums.

Description: Synthetic-resin gum in powdered form contains 90% active material, has high degree of uniformity, and does not contain impurities associated with natural gums.

(Synthogum PR is available from Hart Products Corporation, 1440 Broadway, New York 18, N.Y.)

Check 5523 opposite last page.

Fewer Fines • Easier to Handle • Economical



You win three ways when you specify "National Maleic Anhydride Tablets":

Pressed to shape in modern tableting machines, they resist degradation. As delivered, they contain 75-90% fewer fines as shown by screen-analyses comparison with other leading brands after a 1,000-mile truck haul

They are uniform because they are made by a continuous catalytic-oxidation process developed by National Aniline Research.

You get mixed car or truckload rates on combination orders for any of the resin-chemicals listed on shipments from plant or many branch warehouse stocks.

You'll like our quality, service and price. Why not get our quotation on your next order?

MALEIC ANHYDRIDE
Tablets — Rods — Molten

Phthalic Anhydride
Hexahydrophthalic Anhydride
Tetrahydrophthalic Anhydride
Nadic® Anhydride
Dodeconylsuccinic Anhydride
Fumaric Acid
Succinic Anhydride
Succinic Acid
Maleic Acid
Adipic Acid



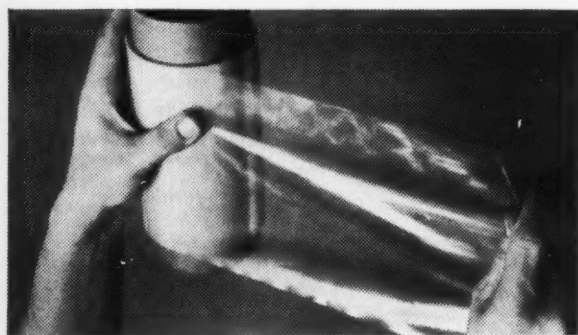
NATIONAL ANILINE DIVISION ALLIED CHEMICAL CORPORATION
40 Rector St., New York 6, N. Y. • Akron Atlanta Boston Charlotte Chattanooga Chicago
Greensboro Los Angeles New Orleans Philadelphia Portland, Ore. Providence San Francisco Toronto

Check 5524 opposite last page

HOW **HERCULES** HELPS...



KEEP COWS CONTENTED—A number of Hercules ingredients contribute toward healthy, more productive livestock. Daltac® BHT, for example, is a high quality feed antioxidant that promotes full assimilation of essential nutrients and protects vitamin potency. Hercules para-cresol is the basis for intermediates used in the production of growth stimulants and other pharmaceutical chemicals. Sprays based on Thanite® protect animals from annoying and often harmful insect pests.



PIONEER NEW PRODUCTS—Pro-fax®, Hercules' new polypropylene, makes transparent film with exceptional resistance to chemicals, oils, greases, and will withstand heats to 300° F. Rigid enough for use in overwrap machines, new Pro-fax films have excellent impact and tear strength and can be heat-sealed with conventional equipment.



UPGRADE FOOD FLAVORS—Monosodium glutamate from the Huron Division of Hercules is being used by an ever increasing number of food packers to enhance the quality of their products. MSG increases taste appeal—and sales—of a wide variety of processed foods.

*Hercules trademark

HERCULES POWDER COMPANY

900 Market Street, Wilmington 99, Delaware

CHEMICAL MATERIALS FOR INDUSTRY

Check 5525 opposite last page

HERCULES

CHEMICAL MATERIALS

Economy paper process increases dry strength, triples wet strength

Uses: New uses opened up by wet-strength paper can be further broadened because of drastic cost reductions made possible by this high-efficiency process.

Features: When added to paper pulp, melamine resin increases dry strength and more than triples wet strength of paper and paperboard.

Description: Process which utilizes melamine resin imparts superior wet strength to paper and paperboard, at a 30 to 60% reduction in resin use.

(Melostrength resin process is development of Paper Chemicals Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N.Y.)

Check 5526 opposite last page.

Dimethylol phenol

Two new studies on dimethylol phenol resins as vulcanizing agents for butyl rubber: Bult 100-4, 100-4B — Thiol Chemical Corp., 780 North Clinton Ave., Trenton 7, N.J.

Check 5527 opposite last page.

Introduces six reactive chlorinated p-xylene derivatives

Series of six chlorinated p-xylene derivatives, α -chloro-p-xylene (mp: 13°C), α,α' -dichloro-p-xylene (mp: 100°C), α,α' -hexachloro-p-xylene (mp: 110°C), 2-chloro-p-xylene (mp: 2°C), 2,5-dichloro-p-xylene (mp: 71°C), and 2, 3, 5, 6-tetrachloro-p-xylene (mp: 223°C), undergo a number of reactions with both inorganics and organics. Some form polymers. In quantities of less than 2000 lb, introductory price is \$2 per pound.

(Chlorinated p-xylene compounds are products of Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio.)

Check 5528 opposite last page.

CHEMICAL PROCESSING



G58-3

BY WILLIAMS CUPROUS OXIDE

for Navy Specification
Shipbottom paints—and other
Marine Anti-fouling paints.

CO-97 CO-90



These two Cuprous Oxides . . . CO-97 and CO-90 . . . as made by Williams . . . meet all chemical and physical requirements of U. S. Navy Specification MIL-C-15169 (Ships) for Type I and Type II. They are produced in a modern plant especially designed to supply Navy demands during World War II.

NOTE: Also for fungicides, insecticides, and a reagent for catalytic work.

ESSENTIAL PROPERTIES

	CO-97 (Type I)	CO-90 (Type II)
Cu ₂ O—Min.....	97%	90%
Total Cu—Min....	86%	80%
Cl—Max.....	0.4%	0.4%
SO ₄ —Max.....	0.1%	0.1%
Acetone Sol.—Max.	0.5%	0.5%
HNO ₃ Insol.—Max.	0.3%	1.0%
325 Mesh—Max..	0.5%	0.5%
Metals not Cu—Max.	0.5%	—

For complete information on prices, packages and samples, please get in touch with your nearest Williams representative, or write us direct.

Address Dept. 75, C. K. Williams & Co.,
640 N. 13th Street, Easton, Pennsylvania.

WILLIAMS

COLORS & PIGMENTS

C. K. WILLIAMS & CO.
Emeryville, Cal., E. St. Louis, Ill., Easton, Penna.

Check 5529 opposite last page

CHEMICAL MATERIALS

Pesticide carrier yields higher absorptions

Uses: As pesticide carrier, bulking agent, and static-free conditioner for 99% sulfur grinding.

Features: Spray-dried pellets of carrier yield higher absorptions and suspension values when airmilled or finely ground with toxicants such as DDT in the formulation of high-concentrate wettable powders.

Description: Silica pesticide carrier packs tighter and saves more than 20% in storage space over regular powder form, at no price increase. Price of spray-dried carrier is eight cents per pound, f.o.b. Havre de Grace, Maryland, same as for regular milled material.

(Zeolox 7A is product of J. M. Huber Corporation, 100 Park Ave., New York 17, N. Y.)

Check 5530 opposite last page.

Herbicides promise curb of perennial weeds

Uses: Herbicidal compounds.

Features: Herbicides based on new compounds show outstanding promise for control of bindweed and other deep-rooted perennial weeds on agricultural lands and industrial areas at reasonable cost.

Description: Compounds are based on 2, 3, 6-trichlorobenzoic acid. Herbicides will be available for commercial use during 1958 growing season.

(Herbicidal compounds are product of Heyden Newport Chemical Corporation, 342 Madison Ave., New York 17, New York.)

Check 5531 opposite last page.

Dysprosium oxide data

Physical, chemical, and high-temp properties of dysprosium oxide are listed in Sheet 501 — Research Chemicals Inc., PO Box 431, Burbank, Calif.

Check 5532 opposite last page.

... a highly reactive gas;
a strong Lewis acid;
a flame-speed accelerator
with an extremely high
heat of combustion —
DIBORANE B₂H₆

Diborane, the simplest of boron hydrides, decomposes slowly at room temperature—and more rapidly at higher temperatures—to hydrogen and higher-molecular-weight boron hydrides. It is completely hydrolyzed by water—either neutral or acidified. Diborane burns in air with a green flame to give boric oxide and water (or boric acid).

Applications include uses as intermediate, reducing agent, catalyst and flame-speed accelerator. It can be stored at low temperatures and can be handled safely with suitable precautions. Write for Technical Bulletin C-020.

Phone: FOrest 4-1130 TWX: Perrysville, Pa. 117



CHEMICAL COMPANY

PITTSBURGH 37, PENNSYLVANIA

Check 5533 opposite last page

Binks spray nozzles

for washing, cooling, processing,
humidifying, dehydrating, and
hundreds of other applications.

You'll get the right nozzles quicker by calling Binks...manufacturers of one of the most complete selections ever produced.

There is a size and spray pattern for every purpose...with nozzles cast or machined from standard or special corrosion-resistant metals and materials.

MAIL COUPON
NOW!

Binks

A COMPLETE LINE OF
INDUSTRIAL SPRAY NOZZLES
AND COOLING TOWERS



Binks Manufacturing Company
3120-32 Carroll Ave., Chicago 12, Ill.
O. K. Binks, send me your comprehensive Spray Nozzle Catalog without obligation.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Check 5534 opposite last page



ACIDS, CORROSIVES AND SOLVENTS



HOT LIQUIDS

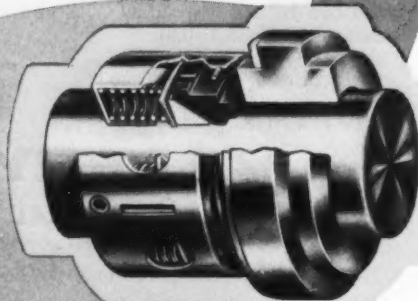


TOXIC GASES AND VAPORS

JOHN CRANE

**TYPE
9**

MECHANICAL SEAL



WILL HANDLE THEM ALL!

Wedge and sealing rings molded from DuPont Teflon assure efficient, safe handling of all known industrial chemicals and corrosives at temperatures varying from -120°F. to $+500^{\circ}\text{F.}$ Spring and metal parts are furnished in the metallurgical specification best suited to the particular service. In every way, you get a mechanical seal that is "John Crane" engineered to your requirements—no matter how tough!

The Type 9 Seal has and continues to solve innumerable problems where difficult-to-handle liquids and gases are involved... at pressures up to 750 psi. It can do the same for you.

Use the Type 9 Seal on all rotating shaft equipment—centrifugal and rotary pumps, mixers, agitators, autoclaves, other equipment.

REMEMBER: Your toughest problem can be the Type 9's next success story. Send for full details today.

Crane Packing Co., 6421 Oakton St., Morton Grove, Ill., (Chicago Suburb). In Canada: Crane Packing Co., Ltd., Hamilton, Ont.



CRANE PACKING COMPANY

Check 5535 opposite last page

How Much of A Market?

From page 28

More important are the ratings that customers give their suppliers. These opinions are obtained by personal interviews. Since ammonia has been in short supply for ten years, consumers have had ample opportunity to observe and rate various producers on product allocation, technical service, pricing, meeting of specifications and seasonal demand, and providing fixed nitrogen in various forms to satisfy customer preference.

Market Entrenchment

Number of years that a supplier has served a certain marketing territory is important. Established companies have had time to develop helpful relationships with their customers. These, together with traditional advertising and agronomic activities, establish company identification in the industry. A new supplier can be at a disadvantage for as long as five years before he is completely accepted.

Proximity to Marketing Territory

Although proximity to marketing territory is an advantage that varies widely among products, it should always be considered. For ammonia and nitrogen products with high peak demands, its importance is amplified. The distant supplier is at a distinct disadvantage.

The factor of proximity to market favors any company that constructs the sales territory around its production site. This general situation holds true for most products, although infrequently there may be concentrations of competitive producers because of the regional availability of either raw materials or power supply.

Plant Capacity

Relative plant capacities of competitive organizations suggest the sales volume that each company needs, and provide a measure of the pressure under which their sales forces operate. If necessary, small producers can scatter their

NEW DEVELOPMENT FROM GENERAL ELECTRIC ...

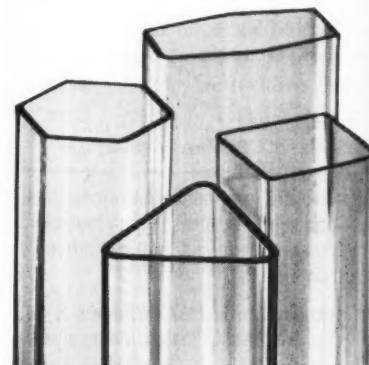
QUARTZ TUBING IN NEW SHAPES!

- Same high standards of purity and precision as regular cylindrical tubing

- Special shapes can be made to your specifications... in virtually any polygonal shape

Now you can get non-circular quartz tubing! Priced only slightly higher than standard round tubing, it will be sold by the piece, foot or pound—according to type. Lengths up to six feet or more, circumferences up to two inches per side on a square. Excellent optical and insulating properties—softening point is 1667°C. Low coefficient of expansion... essentially free of Boron impurities.

Immediate demand seen in electronics industry in the production of semi-conductor transistor instruments. Special shapes can be made and cut for use as insulators and liners in the production of radio and electronic components. For full particulars, write: General Electric Co., Lamp Glass Dept., Nela Park, Cleveland 12, Ohio.



Progress Is Our Most Important Product

GENERAL ELECTRIC



Check 5536 opposite last page
CHEMICAL PROCESSING

output over a given area, while larger plants concentrate sales effort to avoid excessive freight costs, since area of freight-equalization is essentially independent of plant size. A large plant can cover a slightly greater area, but only to the extent that process economics are improved by plant size. Return on investment generally levels off after plant capacity reaches 150-200 tons of ammonia per day.

Results

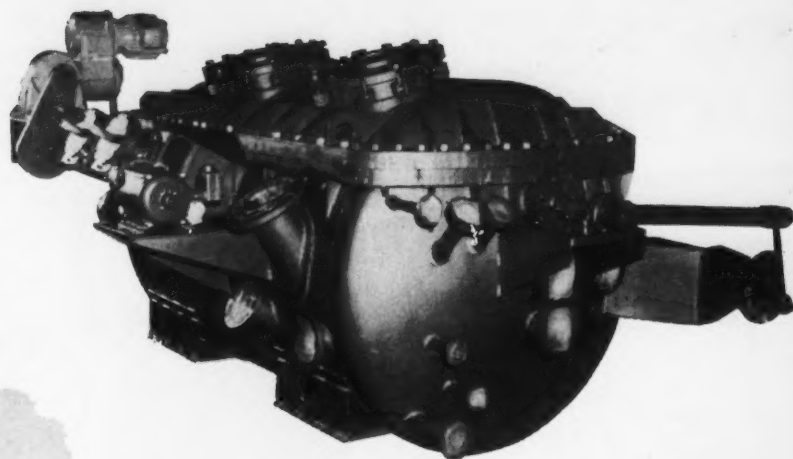
The total column of the rating table indicates that Nitronium should capture 9/124 of the market or about 7.3% which amounts to approximately 200 tons of ammonia per day. After five years, all competitors would rank 3 for market entrenchment, and the total would change from 124 to 143, and Nitronium's rating would total 11. Nitronium's share of the market will then be 11/143, or 7.7% — if competitive forces remain static. Because market strength is not static, Nitronium should not plan on expansion without first re-evaluating its relative marketing strength.

Following the pattern of product consumption in the area, Nitronium would sell 25% of the nitrogen as ammonia, 45% as nitrogen solutions, and 30% as ammonium nitrate. Our experience indicates that Nitronium's sales distribution among the five



h2-52-5"

"I'm not surprised . . ."



CONTINUOUS PRESSURE FILTRATION

In its constant search for the dependable and the economical in liquid-solids separation, Eimco has pioneered the development of Continuous Pressure Filtration.

Through the competent work of our efficient Research and Development Engineers we have proved both machines and methods in many difficult installations.

Just as Continuous Pressure Filtration is the answer to fuels for the missile age, it may be of real interest in some of your filtration problems.

This development of Continuous Pressure Filtration opens a whole new field of techniques for liquid-solids separation that carries the promise of better recoveries at less cost.

THE EIMCO CORPORATION

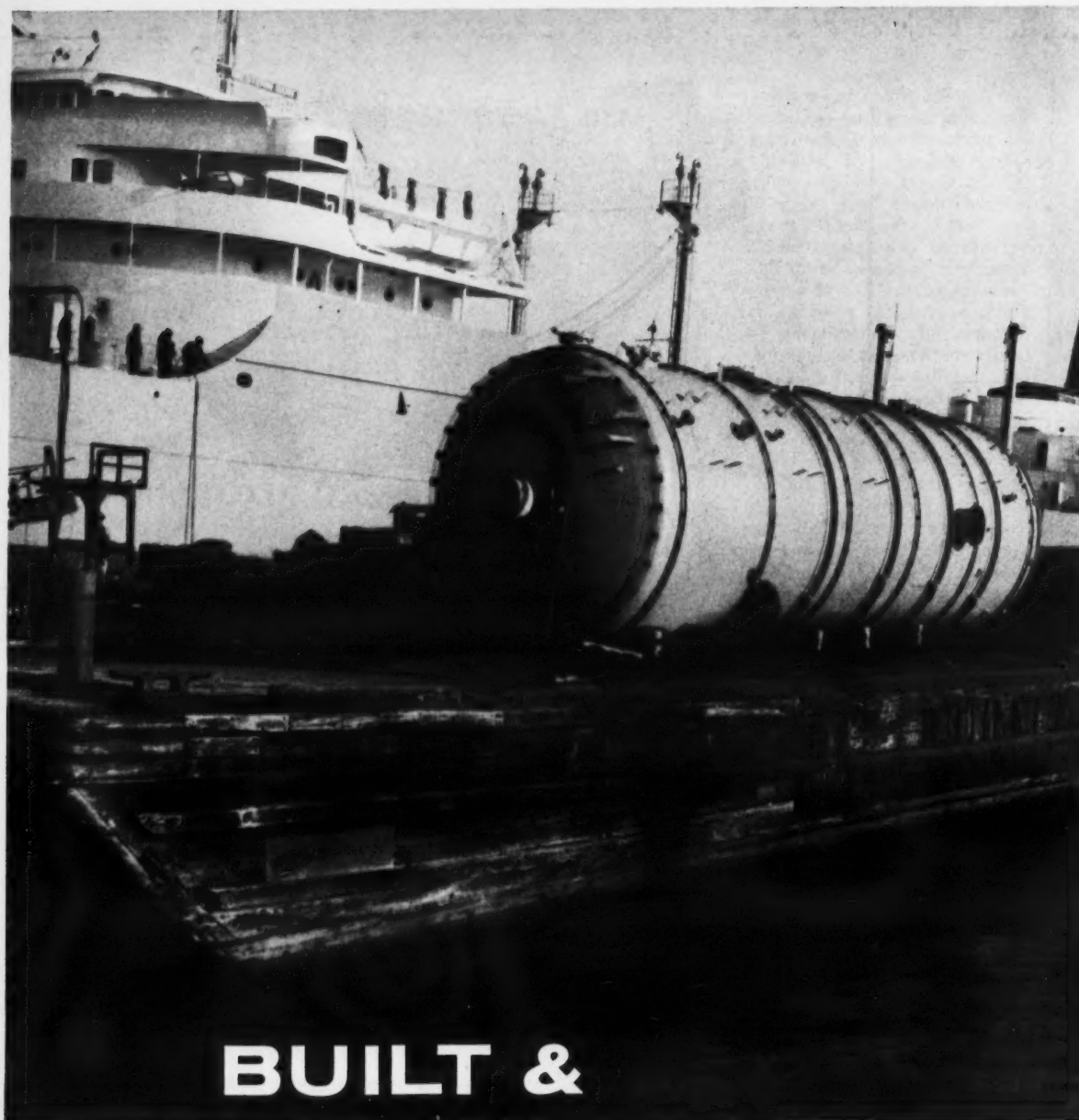
SALT LAKE CITY, UTAH

Research and Development Division, Palestine, Illinois
Export Office: Eimco Building, 51-53 South Street, New York 5, N. Y.
Process Engineers Inc. Division, San Mateo, California
BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

B-309



Check 5537 opposite last page



BUILT & SHIPPED... ON TIME

Today, modern oil refineries and chemical plants require more and more complicated pieces of fabricated equipment—too large to ship by rail or road. To meet this need, Sun Ship specializes in building and shipping large carbon or alloy steel units by water (inland, coastal or overseas)... directly from our plant.

SUN SHIP
BUILDING & DRY DOCK CO.
CHESTER, PENNSYLVANIA

Check 5538 opposite last page

How Much of A Market?

From preceding page

areas on the freight-equalization map should be: 20% in the zone of freight advantage; 33% in the \$0.00-2.50 zone; 26% in the \$2.50-5.00 zone; 13% in the \$5.00-7.50 zone; and 8% in the \$7.50-10.00 zone.

Any larger portion of the market adjacent to the Nitronium plant would give the company an unrealistic share of sales in that area, so these percentages reflect an effort to achieve a breakdown of regularly decreasing fractions in moving from the central area to the outer limit. Total freight-equalization costs will be about \$190,000 per year, or an average of \$2.60 per ton of ammonia produced.

Non-commodity Products

What happens when market territory cannot be approximated by freight costs, as in non-commodities? These are usually higher-priced and freight is only a minor portion of the cost. Competitors often cover the entire United States from numerous, widely distributed sales offices.

Yet the same factors used to assess the marketing strength of Nitronium also can be applied to producers of non-commodities, although relative importance will vary widely with the product.

Sales ability usually has greater bearing on market strength than with producers of commodities. Market entrenchment of the supplier is also more important to a customer of non-commodities. Comparative market capacity of producers can be used as a measure of competitive supplier's need to compete. Proximity to markets is usually only a minor factor, although it should not be ignored. High-priced, small-volume materials are usually sold from supplier's inventories, with customers gaging proximity by distance to the nearest warehouse.

For non-commodities, the relative values of the indices would normally fall in the range of 5-10 for sales ability, 4-6 for market entrenchment, 4-6 for plant capacity, and 2-4 for proximity to markets.



Capital investment in Canadian petrochemical plants according to area

During the past seven years, petrochemicals have grown more rapidly in Canada than anywhere else in the world. Although marketing and the tariff are problems to producers, the \$400-million investment in plants at present plus predicted boom continuation show —

CANADIAN PETROCHEMICALS STILL SURGING FORWARD

L. D. SMITHERS, President
Dow Chemical of Canada, Limited
Sarnia, Ontario, Canada



Although Leroy DeHart Smithers is president of one of the largest petrochemical companies in Canada — Dow Chemical of Canada — he is a native of Cameron, Missouri.

After receiving a BS degree in mechanical engineering from the University of Missouri in 1931, he began his career in St. Joseph, Missouri, and in the coal fields of Oklahoma. In 1936 he joined Dow Chemical with its subsidiary, Dowell Incorporated.

Later he was with the Dow Texas Division at Freeport and in styrene plants in both Midland, Michigan, and Los Angeles, California. He was sent to Sarnia, Ontario, in 1946, where he held a number of executive positions prior to becoming president in 1956.

During the last seven years, petrochemicals (chemicals derived mainly from petroleum or natural gas) have grown at a more rapid rate in Canada than anywhere else in the world. Nearly \$400 million is already invested in Canadian petrochemical plants, and products valued at about \$200 million are being turned out annually. Outlook for the future is good despite marketing problems and unfavorable tariff factors.

It has been said that more than 3500 petrochemicals are in everyday use in North America. Although Canada manufactures

only about 200 of these products now, production of petrochemicals is the fastest-growing segment of Canada's chemical industry.

In 1941 Canada's first petrochemical plant began production of ammonia in Calgary. In 1943 a synthetic rubber plant was built at Sarnia. Since 1950 the building of such plants in Canada has assumed boom proportions.

Reasons for Growth

Although causes for this rapid growth are many and complex, several factors stand out as ma-

ajor contributors to this boom:

a) Canada's rapidly increasing population now provides a domestic market which permits economical production of certain petrochemicals.

b) Discovery of oil and natural gas in Alberta, and the installation of pipelines to the east, provides assurance of a long-term supply of feedstocks at reasonable prices.

c) Since World War II Canada has moved rapidly to broaden its economy from one based largely on mining, forest products, and agriculture, to one in which secondary industry is im-

CANADIAN PETROCHEMICALS SURGING FORWARD —From preceding page

portant. This has created a surge in demand for certain petrochemicals.

d) During this period Canada has experienced prosperity affecting all sections of the economy. During the five years from 1952 to 1957 Canada's gross national product increased 34%. (During the same period the GNP in the US increased 25%.) This has improved per capita purchasing power for all products, including petrochemicals.

e) The boom itself has created an optimism towards Canadian production of petrochemicals which is not fully justified by today's market. Some of the industry's recent investments will be sound only after the economy has advanced considerably beyond its present state.

Location of Plants

As might be expected, Canada's petrochemical plants are largely located near the oil and gas producing fields or near the large refining centers. (See map.) There are operations in Edmonton, Alberta, producing a wide variety of petrochemicals including acetaldehyde, acetic acid, acetone, ammonia, ammonium sulfate, formaldehyde, methanol, pentaerythritol, polyethylene, n-propanol, and propylene glycol. In the Calgary, Alberta, area, ammonia is produced and sulfur is extracted from natural gas.

At Sarnia, Ontario, refinery gases are processed to produce such products as ammonia, benzol, butadiene, carbon black, chlorinated solvents, ethanalamines, ethyl chloride, ethylene, ethylene glycol, ethylene oxide, methyl chloride, styrene, synthetic rubber, tetraethyl lead, and toluene. Under construction at Sarnia is a plant to provide such petrochemical feedstocks as benzene, butadiene, ethane, and ethylene. A polyethylene plant has also been announced for this area.

In the Montreal-Kingston area, oil and refinery gases provide such petrochemicals as acetone, ammonia, ethanalamines, ethylene glycol, formaldehyde, isopropyl alcohol, pentaerythritol, phenol, and polyethylene.

The Canadian market for petrochemicals is relatively small. With a population of about 10%

that of the US, and a per capita consumption of petrochemicals about 60% that of the US, the Canadian market is roughly equivalent to that of the State of California. Although much of this is concentrated in southern Ontario and Quebec, some of it is spread over an area 400 miles wide and 3000 miles long.

There is no doubt that opportunities for growth are great. Canada's birth rate and immigration policies are expanding her population at a rapid rate (2.8% per year in Canada versus 1.8% per year in the US). Canadian per capita income and per capita consumption of chemicals is increasing rapidly. As the US and Europe become more dependent on Canada's vast resources, her economy will surely become increasingly buoyant. The statistician inevitably plots a sharply inclined curve to Canada's future.

The Canadian petrochemical producer, nevertheless, finds it difficult — often impossible — to earn on capital invested in Canada the same return he might expect in the US or Europe. The two major reasons for this are closely related, i. e., a very small market and a border relatively wide open to imports.

In few manufacturing processes are volume and cost more closely related than in the production of petrochemicals. Producers strive to achieve relatively low costs by producing a wide range of products from intermediates produced in large volume. Not many of these petrochemicals are used in significant quantities in Canada, so such integration is impossible. Those producers who have attempted to attain some measure of integration have looked to exports to keep their products in balance. They have often found themselves producing petrochemicals which are not "exportable" to most countries because of prohibitive tariffs, monetary controls, or other restrictions, and are admitted to their own market duty free.

Free-trade advocates say that Canada has "high" tariffs on petrochemicals, and point to the range of 7½% on most plastics to 20% on a wide variety of organics. Producers say that 7½% is inadequate for most petrochemicals, and that much of the

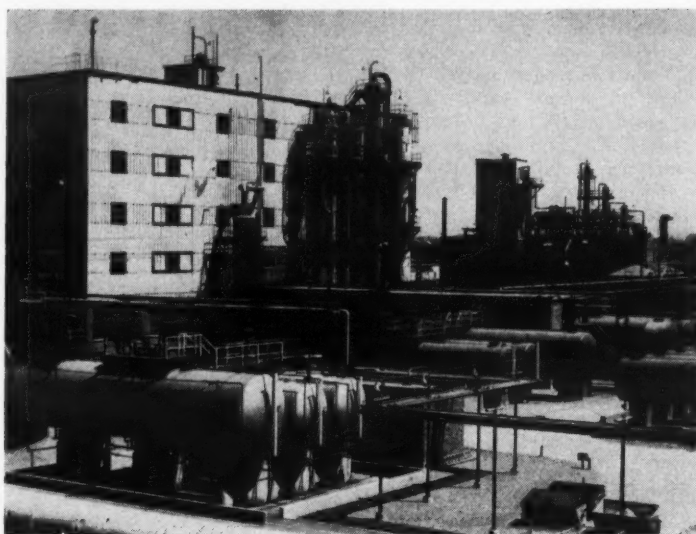
so-called protection is more apparent than real. The Tariff Act provides for free importation of chemicals for such widespread end uses as agriculture, mining, and the manufacture of synthetic rubber. It also provides for a refund of duties paid for materials which go into products for export, eliminating much of the protection on chemicals for such basic products as pulp and paper. Even dumping duty, a penalty, may be recovered if the end product is exported.

Industry has asked the government to review the chemical tariff schedule, and the Minister of Finance has asked the Tariff

St. Maurice Chemicals, Shawinigan Chemicals, Sherritt Gordon Mines Limited, and Shell Oil Company of Canada. Hence, ready access to vast know-how and capital is provided. Most companies have established Canadian research facilities to develop products indigenous to the Canadian economy, and are placing emphasis on export outlets to overcome shortcomings in the domestic market.

Outlook for Future

Although current problems are many, there is no doubt that petrochemicals will continue to expand. Growth rate since 1950



Glycol plant of Dow Chemical of Canada at Sarnia is a typical petrochemical operation

Board to hear industry briefs late in 1958. If the schedule is modernized, true integration of petrochemical production will likely be accelerated.

Companies in Petrochemicals

Many of Canada's major corporations are now in the petrochemical field, including North American Cyanamid, British American Oil, Canadian Chemical Company, Canadian Industries Limited (ICI), Carbide of Canada, Consolidated Mining and Smelting, Dominion Tar and Chemical, Dow of Canada, Du Pont of Canada, Imperial Oil, Monsanto of Canada, Naugatuck Chemicals, Polymer Corporation,

has been 15% per year, compounded. Although many segments of it are now overexpanded and the rate of expansion has leveled off, there is little pessimism in Canada on the future of petrochemicals there.

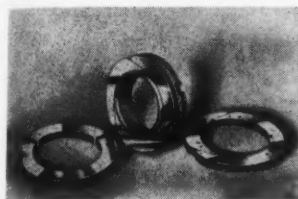
Future growth is of course dependent on many factors, including the health of the Canadian economy and Canadian policies on tariffs. Producers believe optimistically that answers will be found for their problems, and that petrochemicals will continue to expand at a rapid rate.

Some are predicting a rate of 8% to 10% per year. If so, petrochemicals may soon be the tail wagging the Canadian chemical industry dog.

**Improved metal finish
of packing rings —
better sealing**

Uses: As floating metal packing for compressors handling air and industrial gases.

Features: Surface finish is less than 10 micro inches on annular surfaces, whereas previous rings had a finish of 30 to 40 micro inches.



Packing and scraper rings, with improved metal finish, provide more perfect sealing over broader range

Description: Highly finished scraper and packing rings are flat within light band readings, resulting in more perfect sealing over a broader range of applications.

(Packing and scraper rings are available from the Garlock Packing Company, 418 Main St., Palmyra, N.Y.)

Check 5539 opposite last page.

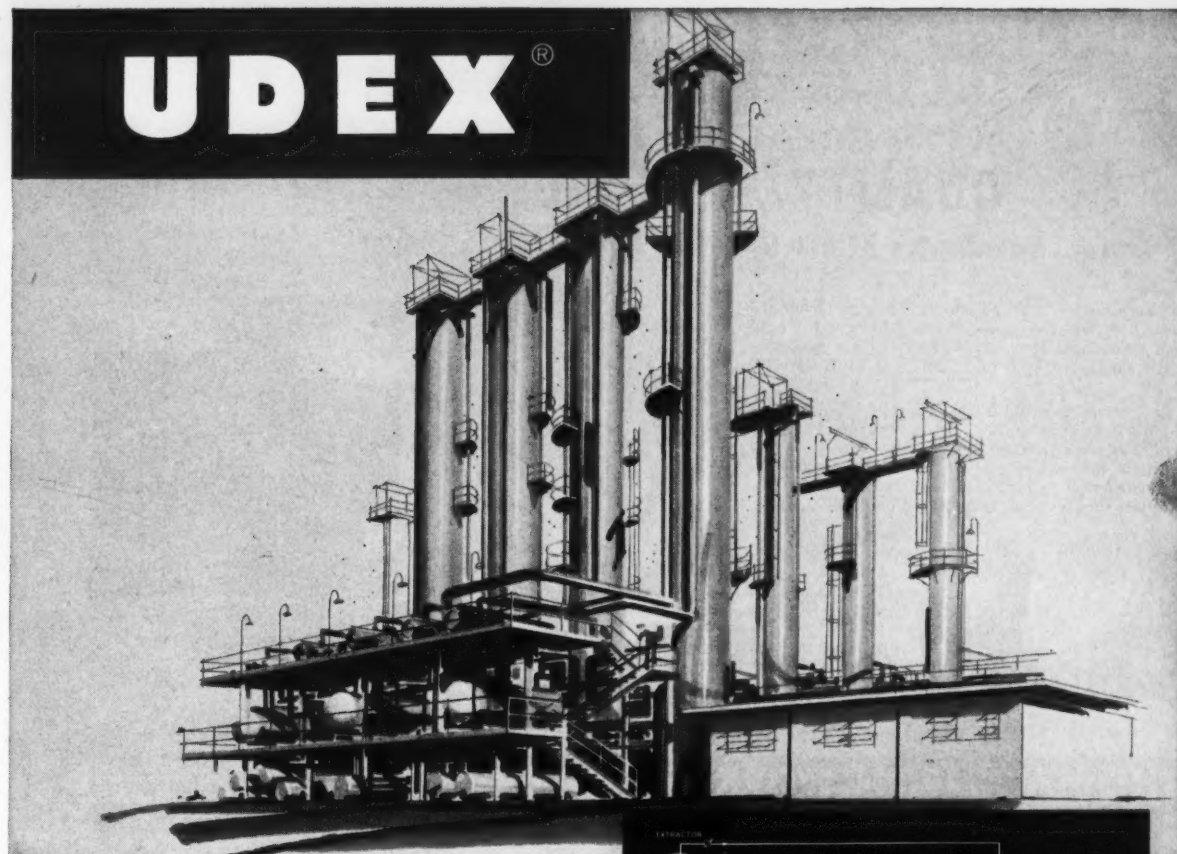
**Engine hp output upped,
fuel consumption cut
by turbocooler**

Higher overload capacity,
less detonation danger

An important potential for increasing horsepower output of gas or gas-diesel engines is provided by turbocooling, a method for supercooling combustion air. Horsepower output increases are as much as 23% in some cases. And according to actual field experience, reductions as high as 5% in fuel consumption are being realized.

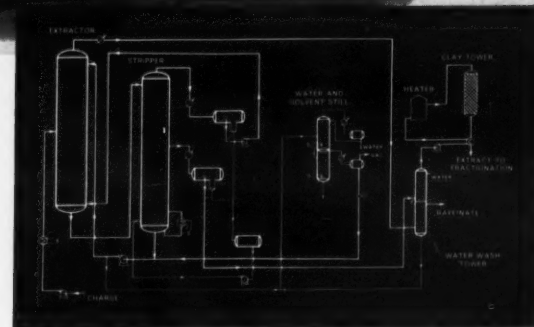
According to manufacturer, over 150 turbocooling units are in operation on supercharged gas and gas-diesel, 4-cycle engines. The first turbocoolers were placed into service in January 1955, providing fuel economies as low

UDEx[®]



The ideal process for separation of super-purity aromatics

You can get substantial production of high-purity aromatics and still keep costs at a minimum with UOP's Udex extraction process. Udex-processed benzene, toluene and xylenes not only meet nitration-grade specifications but exceed these requirements in purity. These aromatics are produced at extremely low cost, since relatively inexpensive and readily available glycol solvents are used in the process. Utility requirements are considerably lower, too. The versatile Udex process permits recovery of aromatics from catalytic reformates, from by-product light oils produced in coke-oven operation, from thermal aromatic



concentrates such as ethylene co-product light oil fractions and other aromatic-rich by-products. Although most petrochemical processors place major emphasis on recovery of benzene, toluene and xylenes, the Udex process also permits recovery of heavier aromatics and dicyclics in high purity. Udex, originated by the Dow Chemical Company, is just one of many UOP refining and petrochemical processes available to the refining industry. A booklet on the UOP Udex process is yours for the asking. For a detailed description of this process, how it works and the economic factors of cost and production, write us on your company letterhead.



UNIVERSAL OIL PRODUCTS COMPANY

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© More Than Forty Years Of Leadership In Petroleum Refining Technology

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BLINDS • SPACER RINGS • STRAINERS • FLANGES

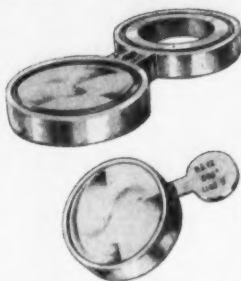


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QUALITY and SERVICE**

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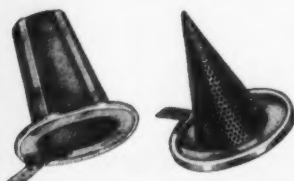
That's right! If an emergency or close schedule catches you—*phone us*. We either have the best of equipment you need in stock or the facilities and skill to make it up at once.

Specialists to the Petro-Chemical Engineering Field for many years MAC-IRON is a producer of temporary strainers, spectacle blinds, spade blinds, and allied equipment which incorporate construction principles, design features, and materials that set them apart as the finest obtainable.



You'll want a copy of MAC-IRON Catalog A-7 which presents a complete engineering picture—Descriptions—Specifications—Data. Your request will receive prompt attention. **PHONE OR WIRE FOR IMMEDIATE PRODUCTION OR CONSULTATION SERVICE.**

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You need MAC-IRON Strainers"**

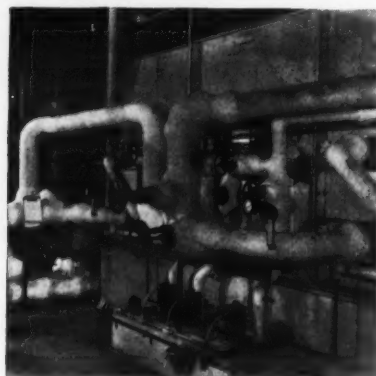


THE MACK IRON WORKS COMPANY

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**... a machine with
"A GOOD
RECORD as a
REVENUE
PRODUCER"**



A typical case of using a Niagara Aero Heat Exchanger to provide cooling for production equipment shows amortization of this machine in 16 months and \$90 per day revenue thereafter.

Industrial engineers with careful cost, upkeep and revenue records on all machines, credit Niagara Aero Heat Exchangers with important gains over other methods.

They use these machines to provide cooling for production equipment, welders, extruders, drawing dies, fur-

naces, quench baths, plating, chemical and electronic process...all millwater system uses.

They get positive control of critical process temperatures with improved product quality, rejection losses prevented. Heat is removed at the rate of in-put.

A closed system, dirt free prevents all troubles from bad water; transferring heat to the atmosphere by the evaporation of a very small amount of water solves all problems of water supply or disposal.

Write for Bulletins 120, 135

NIAGARA BLOWER COMPANY

Dept. CP-6, 405 Lexington Ave., New York 17, N.Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

Check 5542 opposite last page

PETROCHEMICALS

as 6010 Btu per brake horsepower hour.

Basically, the turbocooler is a turbine-driven centrifugal compressor equipped with an aftercooler. Previously, air from the engine turbocharger has been throttled to the air manifold to maintain correct air-to-fuel ratio. Conventional



A turbocooler (arrow) increases horsepower output of engine as much as 23%, reduces fuel consumption up to 5%.

practice has been to do this with butterfly valves. However, this practice has proved a simple waste of energy with little, if any, effect on cooling the intake air.

(Turbocooler is product of the Cooper-Bessemer Corporation, Mt. Vernon, Ohio.)

Check 5543 opposite last page.

Glassed-steel reactor

Installation, operation, and maintenance procedures for glassed-steel reactors are detailed in 12-page Bul 955 — The Pfaudler Co., a div. of Pfaudler Permutit Inc., 1063 West Ave., Rochester, N. Y.

Check 5544 opposite last page.

OMISSION

In article starting on page 87 of our May issue, we failed to mention the vital role played by Turbo-Mixers used on reactors in Celanese polyethylene plant. Units maintain correct mixing environment in critical reaction step of the low-pressure Phillips process. They are made by Turbo-Mixer Div., General American Transportation Corp., 380 Madison Ave., New York 17, N. Y.

METEX

MIST ELIMINATORS

(ENTRAINMENT SEPARATORS)

**Eliminate product loss,
cut operating and
maintenance**

...at low first cost



Metex Mist Eliminators have been used successfully on many applications to knock back liquid entrainment. They are used in any vessel handling liquids and vapors when complete separation of the two phases is desired. Separation efficiency of 99%+ is maintained.

Ask Metex for engineering recommendations. Write today for Bulletin ME-6 and a data sheet.

METEX

**METAL
TEXTILE CORP.**

6-175

ROSELLE, NEW JERSEY

Check 5545 opposite last page

CHEMICAL PROCESSING

LOST YOUR SLIDE RULE?

Then CP's Processing and Engineering Data Section is for you!

Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations. Perhaps, you will find them to be of value to you.

A wide variety of information can be found in this section. So no matter what your particular field you will find suitable data to aid you in your daily work.

And —

the section pages are designed to fit easily into regular data files.

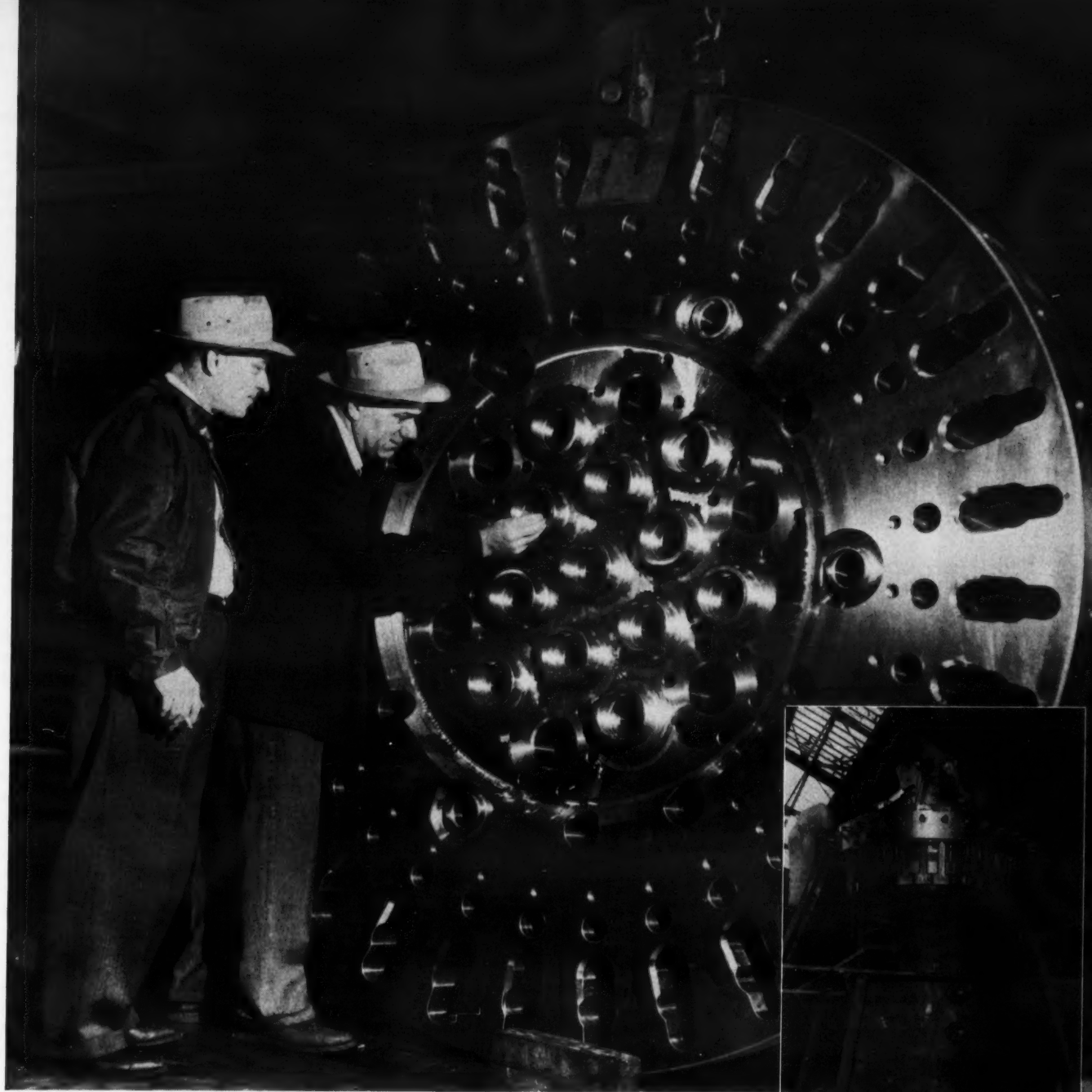
Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebook.

So —

be sure not to miss this month's "Data Section." It begins on page 103.

For more information on product at right, specify 5546 see information request blank opposite last page.



FOR NUCLEAR NEEDS of Knolls Atomic Power Laboratory, M. W. Kellogg was given the exacting assignment of designing and producing a 32½-ton "Proof Test Reactor Pressure Vessel". This was an unusually complex task, because of the quick-opening closure specifications, requiring a head with novel design and extremely close tolerance machining.

FOR NUCLEAR NEEDS of others, Kellogg is supplying the primary coolant stainless piping for two nuclear plants. In addition, Kellogg is equipped to engineer and manufacture heat exchanger equipment for nuclear energy power plants. If these specialized skills suggest a solution to your nuclear problems, call Kellogg's Fabricated Products Sales Division.



This pressure vessel had to be designed with a closure that would open in 30 minutes, and withstand 1500 psi, 550F. Made of Type 304 stainless, the top head has 34 connections, of which 19 required exceptionally close tolerances for control rods.

THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17.

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Societe Kellogg, Paris • Companhia Kellogg Brasileira, Rio de Janeiro • Compania Kellogg de Venezuela, Caracas





STAINLESS...for Moon Travel Tests?

The results of this welder's work may well be headed for the moon someday. For here his skills are being applied to a stainless steel component of ground propulsion test equipment as part of the missiles program. There can be no question about test equipment standing up. Hot formed from Type 347 stainless, this unit, one of a number, was welded and X-ray tested with Graver's modern techniques. When exacting design for missile testing is linked with Graver's skilled alloy fabrication, there's assurance of the quality demanded—in the same manner that Graver has served industry for over a century.

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Check 5547 opposite last page

PETROCHEMICALS

Petrochemical valves

Forty-six-page catalog describes valves designed for petrochemical liquids and gases, as well as chemical and petroleum products. Valves employ a friction-free seating principle which assures positive closure. Among other features are non-turbulent flow, rising stem, stainless trim, welded bonnet, adjustable stem packing, and forged-steel construction that is vapor tight. Unique construction of valve is shown by a large cutaway illustration. Photos and information on a number of field installations are included. Cat 58-B — Orbit Valve Company, PO Box 699, Tulsa, Okla.

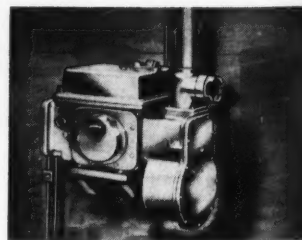
Check 5548 opposite last page.

Tank gage costs less and is less costly to install

Electronic unit can be used
on pressurized tanks

Uses: Measuring liquid levels in tanks under pressures to 250 psi, as well as atmospheric, and in quarry or underground-cavern storage installations to depths of 1000 feet.

Features: Electronic tank gage is less expensive than previous models which were



Electronic tank gage can be
used for pressurized tanks

limited to use in atmospheric vessels. Also, installation expense is reduced. Total cost is thus reduced by almost 50%.

Description: Improved model of gage has increased temperature range to handle products to 175°F. A modification of model is available

with a special sensing element for continual measurement of interface of petroleum product and water. With some other modifications, product temperatures can be measured to 425°F. Accuracy is $\pm 1/16$ inch. Continuous readings of liquid levels can be taken either at the tank site, or remotely, in feet, inches, and sixteenths.

(Improved Gilbarco tank gage is product of Gilbert & Barker Mfg. Co., West Springfield, Mass.)

Check 5549 opposite last page.

Petrochemical plant costing \$330 million rises in Venezuela

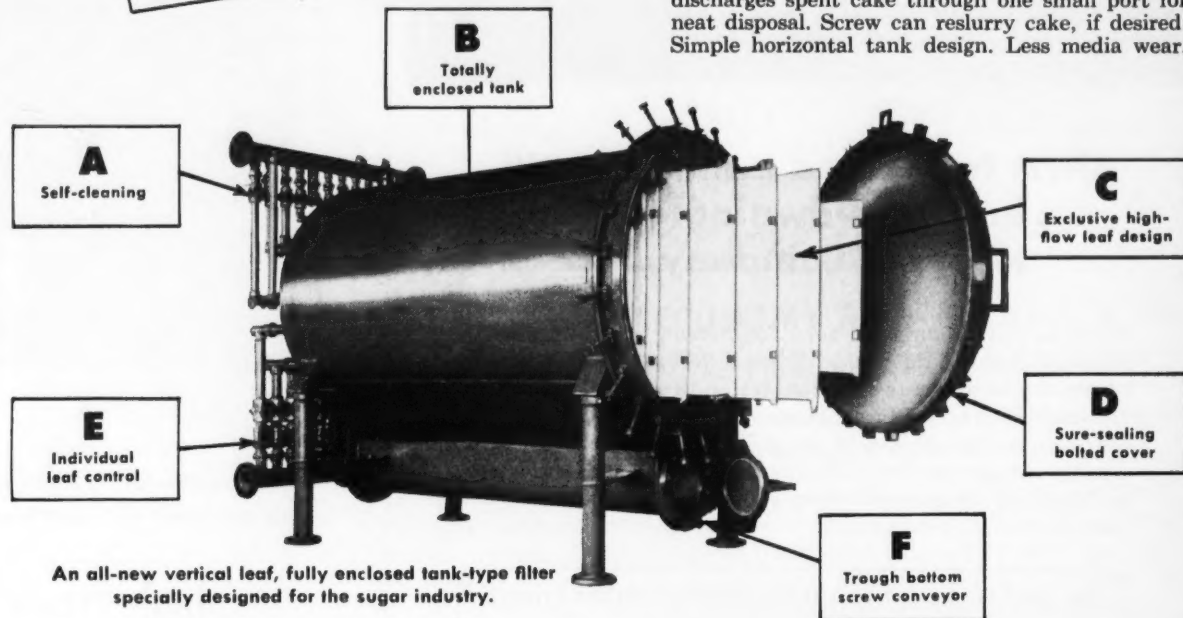
A petrochemical plant — comparable in size to the largest chemical plant in the United States or Europe — is taking shape in Venezuela at Moron in Carabobo state. When construction is completed in 1960, investment will total about \$330 million. When all areas are in operation, 30,000 people will be employed at the plant.

Raw materials will be natural gas and petroleum as well as some mineral products. Fertilizers, insecticides, explosives, synthetic fibers, and a variety of industrial petrochemicals will be manufactured. Fertilizer operations are already on stream.



"I want the names of the men painting unit 6."

SPARKLER *Presents* NEW VERTICAL PLATE FILTER... MODEL RSC



An all-new vertical leaf, fully enclosed tank-type filter specially designed for the sugar industry.

Exclusive Design Features

- A** Internal sprays sluice filter. Can be independently valved for individual operation under low pressure conditions.
- B** No leaking, dripping or air-borne contamination. Assures a neat filter station with clean, sanitary service. Filter may be insulated to minimize heat loss. Can be installed in low headroom, small floor space areas.
- C** Vertical rectangular leaf design assures maximum flow per filtering area and even precoat. Unexcelled rigidity and durability. Hung on roller carriages for easy individual inspection or removal, no bolts or fastenings. Self-sealing in filter. Stainless steel leaves covered with long-life synthetic cloth or stainless steel wire screens.
- D** Bolted cover on double-hung hinge provides full access to interior without leaf removal. Hydraulic quick-opening cover optional.
- E** Individual plate outlet control valves, sight glasses and sample cocks. Any plate or plates may be shut off without removing filter from service.
- F** Trough bottom with screw conveyor discharges cake neatly and quickly without opening tank. Cake can be reslurried if desired.

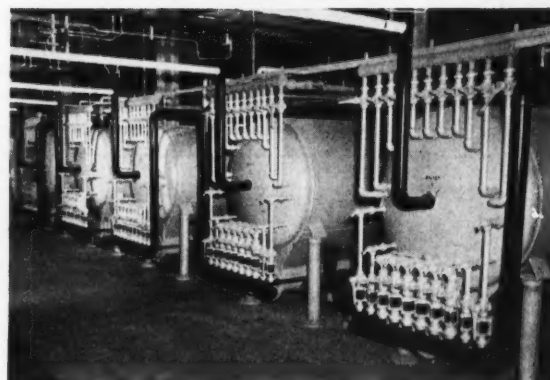
SIZES UP TO 1020 SQ. FT. OF FILTERING AREA

EXCLUSIVE OPERATING ADVANTAGES

Greater Clarity Control—Sight glasses, sample cocks and individual control valves for each leaf provide continuous clarity control. Should any leaf not function properly, it may be shut off without interrupting operation.

Minimum Manpower Required—A single non-skilled individual is capable of operating a large battery of RSC filters including filter aid addition, cleaning, precoat and supervising.

Faster Cleaning, Easier Maintenance—A 560 sq. ft. Model RSC can be cleaned in 10-15 minutes (30-45 minutes total down-time). Leaves are sprayed clean individually. Screw conveyor in trough bottom discharges spent cake through one small port for neat disposal. Screw can reslurry cake, if desired. Simple horizontal tank design. Less media wear.



A battery of five 300 sq. ft. Model RSC filters in operation at Union Sugar Co., Betteravia, California, U.S.A.

Address all inquiries to Sugar Department

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Manufacturing plants in Canada, Holland, Italy and Australia

Filtration engineering and manufacturing exclusively for over 30 years

Check 5550 opposite last page



First fabricated ammonia still ...built at Downingtown for Koppers Company, Inc.

When Koppers Company, Inc., Engineering and Construction Division designed this welded carbon steel plate ammonia still to replace its previous cast iron design, it naturally chose the fabricator with care. Close tolerances were required on positioning of risers, riser slots, bells, trays and weirs. We're proud of the part Downingtown had in this pioneering effort. This still is used for stripping the ammonia from ammonia liquor produced in a chemical recovery coke plant.

THE UNIT WAS BUILT TO THE FOLLOWING SPECIFICATIONS:

Inside Diameter: 7'0"
Over-All Height: 37'10"
Design Data: 12 psi, 650° F.
Operating Data: 7 psi, 250° F.
Shop Test: 12 psi hydrostatic for 90 min.
Total Weight: 60,000 pounds

Send for bulletins describing our experience and facilities.



Interior of bottom section, showing position of rectangular bells fabricated from stainless steel, type 410. Thirteen trays, with bells.

Downingtown Iron Works, Inc.

144 Wallace Ave., Downingtown, Pennsylvania

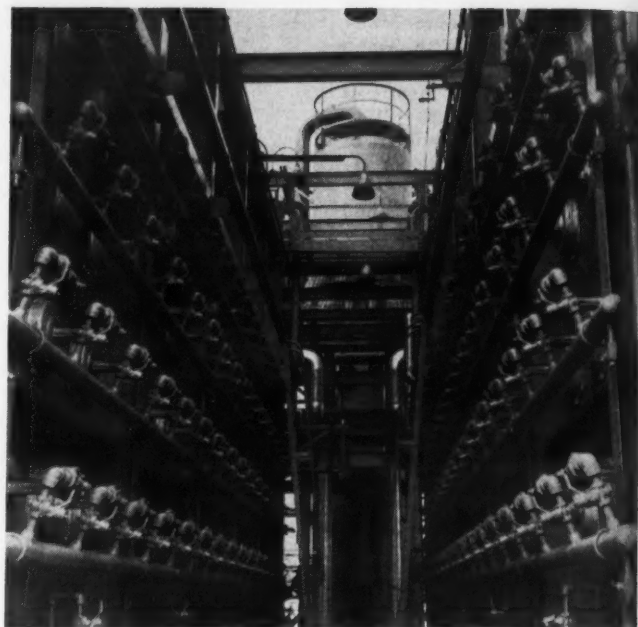
division of **PRESSED STEEL TANK COMPANY** Milwaukee
Branch offices in principal cities

HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS



Check 5551 opposite last page

PETROCHEMICALS



Photos By CP Staff

Burners are spaced to give uniform heating of tubes

**Compact furnaces, which provide controlled
uniform heat at 1500° F, give —**

high ethylene conversion, low tube maintenance

GORDON WEYERMULLER, Petrochemical Editor
With **N. W. WALKUP**, Mechanical Engineer
National Petrochemicals Corporation
Tuscola, Illinois

One of the outstanding advantages of heaters installed during the summer of 1956 at National Petrochemicals for conversion of ethane to ethylene has been found to be their high efficiency. Three cells of 120 burners each are in use. Each cell or furnace cracks about 60 tons of ethane per day. One interesting fact is that this large quantity of material can be produced by a unit occupying so little room. Heaters occupy much less space than more conventional units performing a similar function.

During the period of nearly

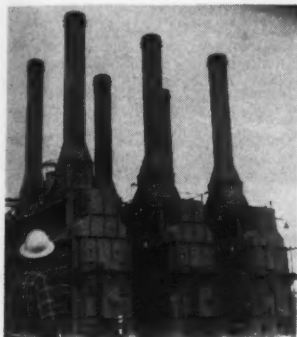
two years in which the heaters have been in service, hardly any downtime has been necessary. Very little tube maintenance has been required in spite of the 1500 °F temperature of operation.

One reason for the good service furnished by the heaters is the design of the units which provide for uniform heating. Tubes are located equidistant between burner walls. Burners themselves are spaced vertically and longitudinally in accordance with experimentally proved determinations. Heat is applied with uniform intensity to all

sides of coil and to entire length of each tube. Local overheating is completely avoided.

Burners operate with excess air in range of 5 to 20%, contributing to the overall efficiency of the operation. Tube scaling is minimized, thereby extending tube life.

Another reason for low tube



Three heaters with 120 burners each are in operation at National Petrochemicals

maintenance is the iron-nickel-chrome alloy (Incoloy) used in the tubes, which is particularly suitable for this type of service. This alloy has the ability to resist embrittlement when subjected to prolonged heating in this atmosphere. It also has high resistance to carburization, a safety factor during decoking.

(Gradiation heaters are product of Selas Corp. of America, Dresher, Pa.)

Check 5552 opposite last page.

(Incoloy alloy is manufactured by The International Nickel Co., Inc., 67 Wall St., New York 5, N.Y.)

Check 5553 opposite last page.

Describes liquid meters

Manufacturer's one-inch, 5000-lb, oscillating piston-type meter is emphasized in two-page bulletin which describes line of industrial liquid meters. Bul OG-352 — Meter and Valve Div., Rockwell Mfg. Company, 400 N. Lexington Ave., Pittsburgh 8, Pennsylvania.

Check 5554 opposite last page.

Free Booklets!

DESCRIBE NEW ECONOMY AND ACCURACY IN WEIGHING OR BATCHING... ELECTRONICALLY

Seven Fairbanks-Morse Volumes Even Show How You Can Make Present Equipment Electronic...

Here's *must* reading for this automation age! Full details on how electronic control and instrumentation speed weighing, accelerate materials flow, eliminate human error. What's more, you'll discover how easy it is to convert your present lever system to electronic operation. Find out how Fairbanks-Morse scales permit remote location of recording instruments for more efficient processing...how they record and print weight data without any mental calculations...how they translate the weight figures into the language understood by automatic typewriters, automatic adders, or motorized tape punches.

Find out from the BATCHETRON folder about an electronic control system for assembling varied quantities of ingredients...in proper sequence...at the push of a button. Or learn from the EPC folder how you can do the job completely automatically with punched cards. Write today for the folders you need.

Address Fairbanks, Morse & Co.,
600 S. Michigan Ave., Chicago, Illinois.



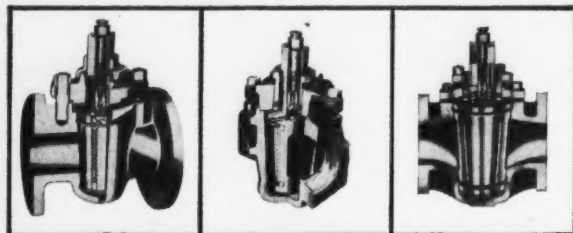
FAIRBANKS-MORSE

a name worth remembering when you want the BEST

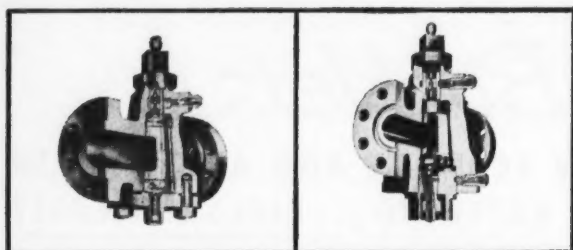
SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

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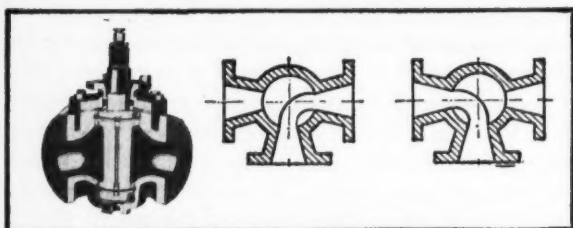
What are your valve needs?
SPECIFY FROM
ROCKWELL-NORDSTROM'S
COMPLETE VALVE LINE



For working pressures from 175-lb to 800-lb, Rockwell-Nordstrom valves are available in semi-steel and corrosion resisting alloys in sizes from 1" to 24".



For working pressure to 10,000-lb, Rockwell-Nordstrom Hypre-seal valves are available in steel and corrosion resisting metals in sizes to 30". Operated by wrench, gear or power actuators.



Rockwell-Nordstrom Multiport valves permit three and even four way control with one valve . . . ideal for batching, blending or relief service. See diagrams for a few of the possible flow arrangements.

Rockwell-Nordstrom is the world's most complete line of lubricated plug valves, plug valve lubricants and operating accessories. Whatever your needs, you'll get better flow control at far lower cost when you specify from the Rockwell-Nordstrom line. Rockwell Manufacturing Co., Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited. Check No. 5536 on the reply slip in this magazine for free details.

ROCKWELL-Nordstrom VALVES

it's **ROCKWELL** 
MANUFACTURING COMPANY

Check 5556 opposite last page

PETROCHEMICALS

Petrochem intermediate improves stability of adhesives

Effective area decontaminant; good biological sterilizer

Beta-propiolactone, a petrochemical intermediate now available in commercial quantities, has a potential embracing a wide range of compounds such as amines, alcohols, and others containing active hydrogen. Additionally, it is used to improve the stability of starch-derived adhesives and in the synthesis of acrylic acid and acrylates. It also modifies textile fibers to improve hand and other properties.

Although beta-propiolactone is a powerful chemical which must be properly controlled for safety under conditions of use, it is reported to be effective for area and surface decontamination. Because of its capacity to inactivate a wide variety of bacteria, fungi, and viruses, it should be a good sterilizing agent for biologicals.

Prices for manufacturing grade are 87 cents a pound in tankcar lots, and \$2.00 a pound in glass containers, all f.o.b. Pampa, Texas.

(Beta-propiolactone is being produced by Celanese Corporation of America, 180 Madison Ave., New York 16, N.Y.)

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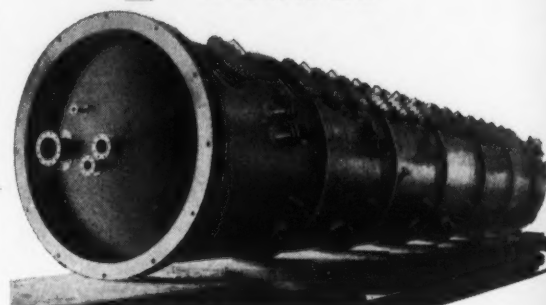
Towering seven stories, giant crystallizer unit cuts fertilizer costs

Believed world's largest stainless crystallizer

Weighing more than 150 tons with a height of 82 ft and diameter of 20 ft, what is believed to be the world's largest stainless steel crystallizer is being used to produce more than 300 tons of ammonium sulfate daily.

The giant crystallizer is in use at the Hopewell, Va., plant of the National Aniline Division of Allied Chemical & Dye Corporation. National Aniline expects that it will

another Custom-Built Vessel



fabricated by The Youngstown Steel Tank Company

This is one of two styrene stripping towers we have recently completed for The Goodyear Tire & Rubber Company. Both towers will be installed in Goodyear's Akron synthetic rubber latex plant.

The towers are 9'0" in diameter by 55'1" high, operating at 30 lbs. pressure and at full vacuum. All welding is ASME code approved and X-ray examined.

These styrene stripping towers are only one example of nearly 1,000 different products that will be custom fabricated by The Youngstown Steel Tank Company this year.

Write us today about the steel plate products you are buying. Our sales, engineering, and production departments will welcome the opportunity to serve you.



**The YOUNGSTOWN
STEEL TANK
COMPANY**

Youngstown, Ohio

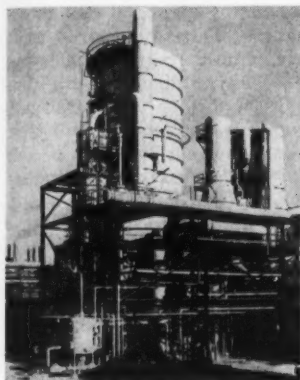
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CHEMICAL PROCESSING

PETROCHEMICALS

be less expensive to make ammonium sulfate fertilizer in one large crystallizer than in a number of smaller tanks. It also reports that a more uniform crystal particle is obtained with the new equipment.

The stainless steel plates for the huge crystallizer were of Type 316, noted for its resistance to corrosion and well



Jumbo-size stainless crystallizer in service at National Aniline

suited for use with ammonium sulfate. The mass of liquid inside the crystallizer is kept at 150°F. The entire process is continuous.

(Stainless steel crystallizer was fabricated by Struthers Wells Corporation, Warren, Pennsylvania.)

Check 5559 opposite last page.

(Stainless steel plates for crystallizer were supplied by Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.)

Check 5560 opposite last page.

Turbine advantages

Bulletin of eight pages describes advantages of manufacturer's high-speed mechanical drive turbines for petroleum, chemical, and petrochemical applications. Flow diagrams show use of mechanical drive turbines in such processes as fluid cracking and fluid hydroforming. Bul GEA-6579—General Electric Co., Schenectady 5, N. Y.

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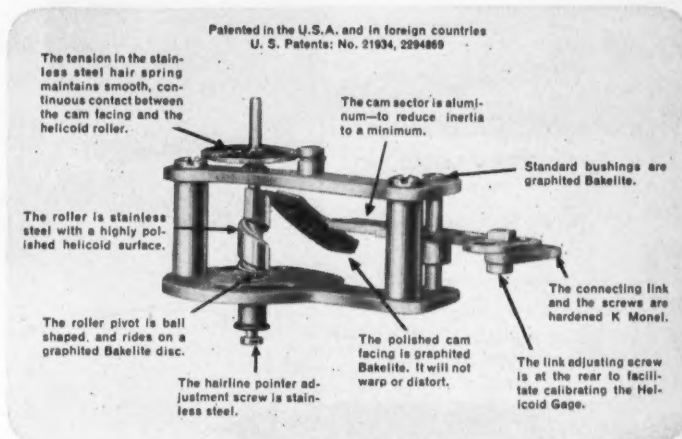
NOTHING BUT THE BEST IN GAGES FOR WORKING PRESSURES FROM 30" VACUUM TO 10,000 p. s. i.

These details of Helicoid gage design assure longer life and enduring accuracy

The superiority of Helicoid Gages is most evident in severe service—wherever a gage is subjected to violent pressure pulsations or severe mechanical vibrations.

The *sustained accuracy* of Helicoid Gages over *millions of cycles* is explained by the details of design and construction of the Helicoid movement shown at the right.

Rolling action of the cam facing against the roller surface . . . graphited Bakelite bushings, roller pivot base and cam facing . . . K Monel connecting links and screws . . . all such Helicoid features protect against wear and corrosion and assure sensitivity, sustained accuracy and trouble-free operation through millions of cycles.



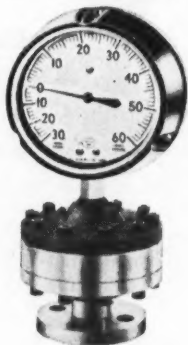
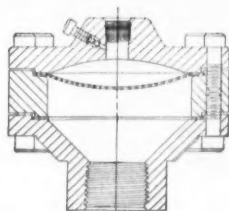
EASIEST ADJUSTMENT AND CALIBRATION

Only Helicoid Gages have the external pointer adjustment pictured here. The Helicoid type adjustment cannot be jarred out of position.

Calibration of Helicoid Gages is accomplished easily, without removing dial or pointer, because the link adjusting screw is at the rear of the system.

THE CHEMICAL GAGE

The Helicoid Chemical Gage has a guaranteed accuracy of plus or minus 1%. It is applicable for working pressures from 30" vacuum to 5000 p.s.i. and temperatures to 400° F. It is particularly suitable for chemicals and other viscous fluids which might clog or corrode a Bourdon tube. Pressure and/or vacuum is transmitted directly to the indicating gage element through deflection of a Teflon or Kel F sealing diaphragm. The indicating system above the diaphragm is filled completely with specific inert liquids.



TUBES BUILT FOR MILLIONS OF PRESSURE PULSATIONS

To fit the wide range of applications, Helicoid Bourdon tubes are available in four materials—alloy steel, K Monel, stainless steel and phosphor bronze.

All Helicoid tubes are made from seamless tubing and are carefully designed to give maximum torque and minimum stress. When used within the dial range, they will withstand many millions of pressure pulsations and will not stretch, leak or crack.



For complete information on the Helicoid line of gages write for Catalog G-52

**Helicoid Gage Division
AMERICAN CHAIN & CABLE**

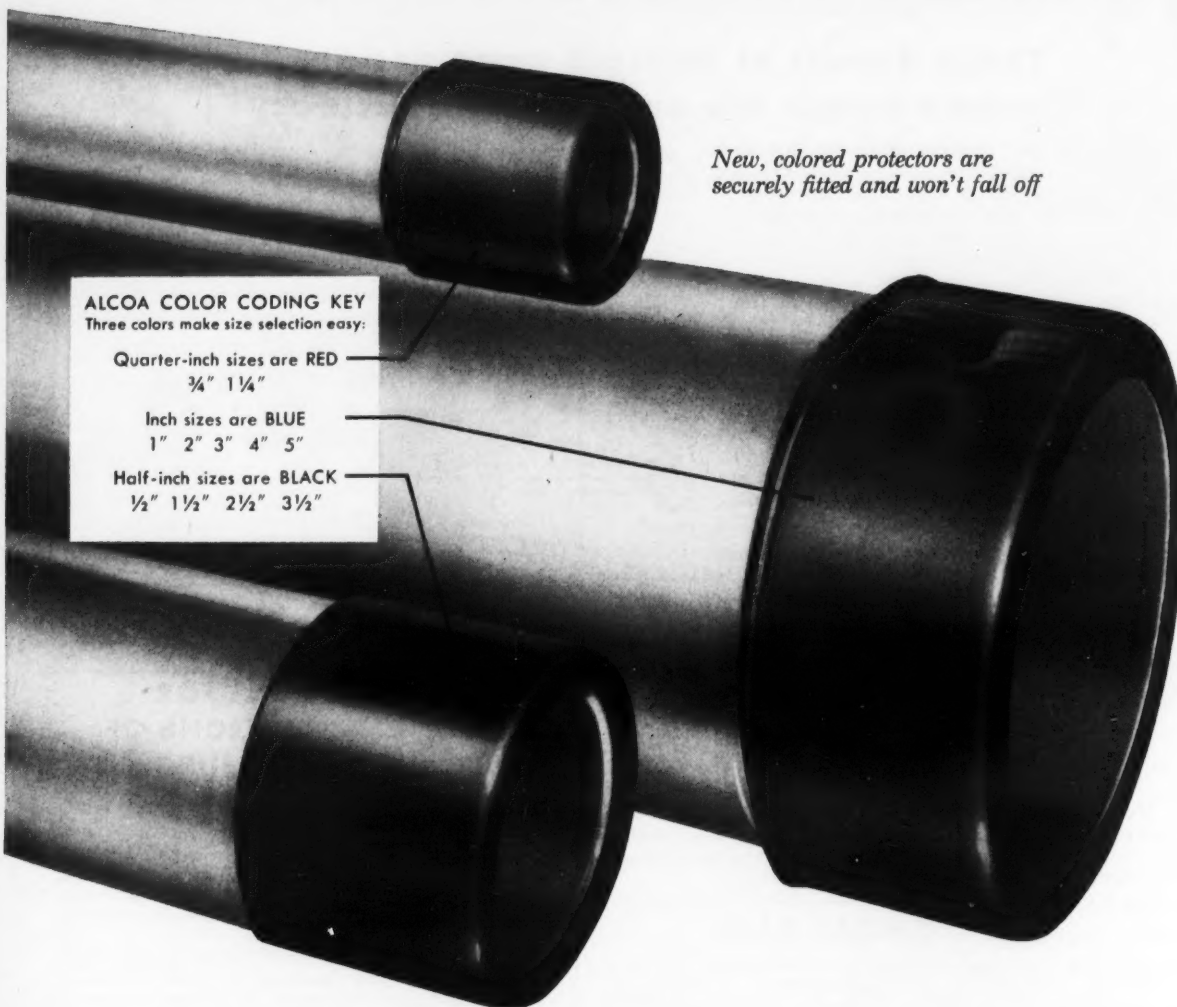
929-P Connecticut Avenue • Bridgeport 2, Connecticut



Helicoid gives you all these features at prices that are competitive in the quality gage field

Check 5562 opposite last page

NOW! COLOR CODING ON ALCOA RIGID CONDUIT SIMPLIFIES SIZE SELECTION AND STOCKING



ALCOA COLOR CODING KEY

Three colors make size selection easy:

Quarter-inch sizes are RED
 $\frac{3}{4}$ " $1\frac{1}{4}$ "

Inch sizes are BLUE
 1" 2" 3" 4" 5"

Half-inch sizes are BLACK
 $\frac{1}{2}$ " $1\frac{1}{2}$ " $2\frac{1}{2}$ " $3\frac{1}{2}$ "

New, colored protectors are securely fitted and won't fall off

Thread protectors on Alcoa® Aluminum Electrical Rigid Conduit are brightly colored to help you tell size at a glance.

These all-new thread protectors are made to stand up under rough handling in the warehouse or on the job. They spell an end to guesswork and time-consuming mistakes in conduit selection.

With new low prices, Alcoa Aluminum Rigid Conduit is today's most economical buy. Its light weight reduces installation costs. It is nonsparking and non-magnetic. Excellent corrosion resistance eliminates painting, reduces maintenance and extends life. Find out why Alcoa Aluminum is *your* best conduit buy. Contact your Alcoa Conduit distributor or write Aluminum Company of America, 2323-F Alcoa Building, Pittsburgh 19, Pa.

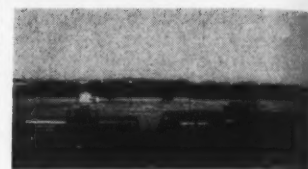


Your Guide to the Best in Aluminum Value



"ALCOA THEATRE"
 Exciting Adventure
 ALTERNATE MONDAY EVENINGS

PETROCHEMICALS



Capacity boosted 90% ...

... with only a 20% increase in cost through use of the 19,000-gal-capacity tank car shown at right in the above photo. This king-size tank car would cost \$14,000 today as compared with the \$11,000 cost of the 10,000-gal-capacity standard fuel oil tank car. The car shown at left for comparison purposes, has an 8000-gal capacity.

Manufacturer predicts that these maximum-load tank cars are here to stay, and will be in use for high-pressure commodities within a very short time.

Cars are suitable for transportation of LPG or anhydrous ammonia.

(Maximum-load tanks cars are manufactured by ACF Industries, Inc., 30 Church St., New York 8, N. Y.)

Check 5564 opposite last page.

Anti-corrosive alloys — Hastelloys, titanium in clad plate form

Developer of cladding process has successfully rolled in clad plate form, four highly corrosion-resistant alloys. Hastelloy B, F, and C, and titanium cladding have progressed to the point where these materials are being handled on an experimental-order basis.

The three Hastelloys and titanium in clad form are expected to bring about considerable cost savings in various applications in the chemical, petroleum, and petrochemical fields where corrosion is a major problem.

(Hastelloy B, F, and C and titanium in clad plate form are available from Lukens Steel Company, Coatesville, Pennsylvania.)

Check 5565 opposite last page.

Check 5563 opposite last page

U.S.I. CHEMICAL NEWS



A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries



A.I.Ch.E. Marks 50 Years Of Progress This June

The American Institute of Chemical Engineers celebrates its Golden Jubilee this year. During the week of June 22, leaders of the American chemical industries, internationally-known figures in the chemical engineering field, and thousands of other members of the A.I.Ch.E. will gather at Philadelphia to attend technical sessions and the official banquet, and to witness the awarding of special achievement citations.

Since 1908, the American chemical process industries and the A.I.Ch.E. have grown together, helping each other advance into the present "Age of Chemistry." The A.I.Ch.E. has been a guiding force behind this progress. U.S.I. itself, founded in 1906 as a producer of industrial alcohol, could hardly have attained its present size and diversification without its chemical engineers and the organization behind them.

To quote the publisher of the Institute's official organ: "From the impressive plateau of its 50 years of progress, the American Institute of Chemical Engineers can look back with pride on a record of outstanding achievement, and forward with confidence to continued service to mankind."

New Lanolin Derivatives Soluble in Water, Alcohol

Polyoxyethylene derivatives of acetylated lanolin have been developed which are completely soluble in water, alcohol, and many oils and solvents. They yield persistent emollient films and have solubilizing properties desirable in cosmetics, pharmaceuticals, toiletries and aerosol formulations.

The materials are non-greasy, clear liquids designed to give a soft, non-tacky after-feel when incorporated into water and alcohol preparations and emulsions. They are produced in two forms: completely acetylated for applications where a high alcohol content is essential; and partially acetylated for aqueous and weak alcohol preparations. The higher the degree of acetylation the greater the hydrophobic and substantive characteristics of the material.

These new lanolin derivatives are suggested for aerosols, shave lotions and creams, hair tonics, rinses and shampoos, insect repellents and sunscreens, deodorants, anesthetics and antiseptics, among many other drug and cosmetic use possibilities.

Fluorinated Polyethylene Keeps Air and Gases Out, Odors and Flavors In

A recent patent claims that the addition of 0.03-3.5% by weight of fluorine to the surface of polyethylene films and bottles makes them substantially impermeable to atmospheric gases, perfume components, aromatic flavor constituents, and preserving or pressurizing gases. The properties of the polyethylene remain

MORE

SRE and Shippingport Reactor Mark Important "Firsts" in Atomic Power Program

SRE First Reactor to Supply Heat to Conventional Power Plant; Shippingport First Complete Commercial Atomic Power Plant

The Sodium Reactor Experiment in Southern California — first non-military nuclear reactor to feed heat into commercial power generating equipment for conversion to electricity — is a sodium-cooled, graphite-moderated experimental

atomic power plant. Built for the Atomic Energy Commission, its purpose is to develop technical data for designing, constructing and operating full scale nuclear plants which will produce power economically.

In this reactor, liquid sodium metal in a closed system is circulated through the core, picking up reaction heat which it transfers to a second, non-radioactive closed sodium system. From this second system the heat is transferred to the power generation equipment of the Southern California Edison Company.

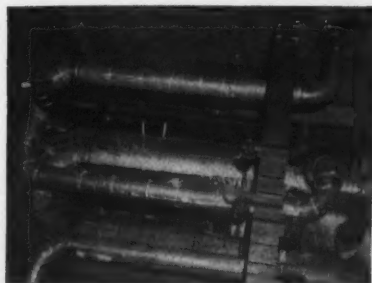
Sodium Coolant Has Advantages

Sodium makes an excellent reactor coolant because of its relatively low neutron-absorbing characteristics, good heat transfer properties, low melting point and high boiling point. High temperatures without high pressure can be produced when sodium is used as coolant.

As part of the experimental program, various fuel elements, components and structural assemblies are being studied in the SRE system. Right now the reactor uses uranium slightly enriched with uranium-235 in the core. Cores containing thorium-uranium alloys are planned for future investigation.

Shippingport Uses Zr, Hf, in Core

The new central-station atomic power plant at Shippingport, Pa. — first in this country to feed electricity into a commercial grid — contains in its core some 14 tons of uranium clad in zirconium metal and zirconium alloy, and control rods made of hafnium and zircaloy.



View of sodium-to-sodium heat exchanger which carries heat from SRE core to power generators. (photo courtesy Atomics International)

Zirconium metal has an extremely low nuclear cross-section — allowing free passage of neutrons — and makes an ideal cladding and supporting material for uranium because it offers minimum interference to the fission process, is corrosion and heat resistant, and structurally strong.

In the Shippingport reactor, the core is composed of 32 seed fuel elements containing about 165 pounds of highly enriched uranium clad with zircaloy. These seed elements are surrounded by 113 blanket fuel elements containing 14 tons of natural uranium clad with zirconium alloy.

Hafnium, although found closely associated with zirconium in nature, has the opposite type of cross-section characteristics. It absorbs neutrons readily, and consequently makes excellent control rod material. In the Shippingport reactor core, each of the 32 seed elements has its own two-part control rod. The absorber section is made of hafnium, the follower portion of zirconium alloy.

This pressurized water reactor plant started delivering electricity on December 18, 1957. It uses ordinary water to moderate the nuclear fission process, and the water under pressure is circulated through the reactor core to remove the heat. The hot water is pumped through heat exchangers to produce steam which in turn is used to power the generating turbines. The plant can deliver 60,000 kilowatts into the system of Duquesne Light.



At Shippingport during final stages of installation, reactor core is being lowered into pressure vessel. Zirconium-clad uranium fuel is contained in this core. (photo courtesy Westinghouse)

U.S.I. CHEMICAL NEWS

CONTINUED

Polyethylene

unchanged.

This development should make it possible to package foods, colognes, other toiletries containing perfumes, aromatic solvents, mineral and vegetable oils and aerosol formulations in polyethylene films or flexible containers — without loss of volatile constituents or entry of deteriorating gases.

The fluorination process is claimed to be simple and economical. Film or bottles are washed free of lint, grease, dust and all foreign matter which might cause fluorine to ignite the polyethylene. After this, the film or container is contacted with pure fluorine or a fluorine-inert gas mixture, at room temperature or at up to 50°C. The length of contact varies depending upon the equipment, fluorine concentration, temperature and thickness of film or bottle.

While clarity, flexibility, tensile strength, heat sealability and ultraviolet transmittance are claimed to remain unchanged, permeability of the polyethylene is decreased many fold. In a typical test with a volatile liquid, 5.6% of allyl caproate was lost from an untreated polyethylene bottle in 40 days. Only 0.05% was lost from a bottle which had received a six-hour fluorine treatment. Testing for oxygen transfer, an untreated film transmitted 303 cc per 100 square inches of surface in 24 hours. A treated film transmitted only 46 cc.

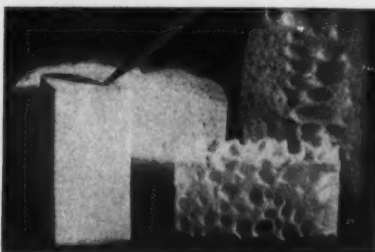
Silicone Additives Insure Uniform Cell Structure in Flexible Urethane Foams

Silicones are now being added to flexible polyurethane foams to give smaller, more even cell structure, uniform resilience and flexibility, and better appearance.

One type is a water-dispersible emulsion which can be added directly to the catalyst phase of the foam system. The manufacturer recommends that it be added as the last component when making up this phase, and claims

that it will remain uniformly dispersed from several days to two weeks in most catalyst systems. Another type is a fluid added directly to the prepolymer and dispersed by thorough agitation.

Flexible polyurethane foams have evoked wide-spread interest as insulation for both industrial and consumer use, as cushioning, and for a variety of specialty applications. They can be produced from the reaction of polyesters with diisocyanates. An intermediate that can be used to produce the polyesters is U.S.I. ISOSEBACIC® Acid, a mixture of C-10 dibasic acids.



Polyurethane foam containing silicone additive has smaller, more uniform cell structure than other samples containing no silicone.

New Sterilizing Method Employs Ethylene Oxide in Safe Aerosol Formulation

The U. S. Department of Agriculture's Entomology Research Division reports that they have found a way to combine highly volatile ethylene oxide with ordinary aerosol propellants to form a non-flammable sterilizing formulation.

Ethylene oxide is a known germicide, insecticide and sterilant, but its highly flammable nature has been a deterrent to its widespread use for these applications.

The new aerosol is designed for sterilizing sensitive materials which cannot stand treatment by steam, dry heat or liquid chemicals.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Radioactive isotopes and isotope-labeled compounds are described in a new price list now available. Included are C-14 compounds, heavy water, deuterium- and tritium-labeled compounds, N-15 compounds of high isotopic concentration. **No. 1350**

Fatty amines are discussed in new 24-page booklet covering method of manufacture, applications, chemical reactions, vapor pressure, solubility and handling. **No. 1351**

1723 Voluntary national standards approved by the American Standards Association are listed in free 67-page index just published. Standards in fields of chemicals, petroleum, rubber, textiles, are included among others. **No. 1352**

Sodium dispersions which improve chemical reaction efficiencies by providing more active surface area are described in 42-page booklet. Latest production equipment for continuous preparation of dispersions covered. **No. 1353**

Paper-strip electrophoresis analysis of various proteins, hemoglobins, amino acids and many organic and inorganic mixtures is outlined in a new catalog describing equipment for the purpose. **No. 1354**

New organic phosphate insecticide (O,O-diethyl S-p-chlorophenyl-thiomethyl phosphorodithiolate) is claimed non-systemic, long-residual, less hazardous than many other organic phosphates. For control of mites and broad range of other insects. **No. 1355**

Plastic pipe for safe transportation of drinking water is discussed in new 12-page folder. Includes types of plastics used, method of joining lengths, suitable applications, standards set by Natl. Sanitation Foundation. **No. 1356**

Chemical analysis of solid surfaces by nuclear methods is described in 33-page U. S. Army report which can now be purchased. Methods used to detect all elements to depth of several microns (sensitivities from 10^8 - 10^{10} gm/cm²). **No. 1357**

Dangerous properties of over 8,500 chemicals, and safe practices in handling, storing and shipping, are outlined in a 1476-page book just put on sale. Toxicity, fire, radiation, air pollution, explosion hazards are covered. **No. 1358**

Tritiated thymidine is now offered in research quantities as a new tool for studies of growth. Material is said to be suitable for investigating cell formation and turnover, genetic patterns, effects of intracellular radiation and growth inhibition in neoplasms. **No. 1359**

PRODUCTS OF U.S.I.

HEAVY CHEMICALS

Sodium, Metallic: cast solid in tank cars, steel drums, pails; bricks in barrels, pails.

Sodium Peroxide, Sodium Sulfite, Sodium Sulfate

Ammonia, Anhydrous: commercial & refrigeration. Tank cars or tank wagons.

Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions

Phosphoric Fertilizer Solutions: wet process phosphoric acid.

Sulfuric Acid: all strengths, 60 Baume to 40% Oleum. Also Electrolytic grade to Federal specifications. Tank cars or tank wagons.

Caustic Soda, Chlorine

OTHER PRODUCTS

PETROTHENE® Polyethylene Resins

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Riboflavin USP, Intermediates.

Alcohols: Ethyl (pure and all denatured formulas); Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL® PR.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, ISOSEBACIC® Acid, Sebacic Acid, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P., Pelargonic Acid, and 2-Ethyl Heptanoic Acid.

Animal Feed Products: Antibiotic Feed Supplements, BHT Products (Antioxidant), Calcium Pantothenate, Choline Chloride, CURBAY B-G®, Special Liquid CURBAY, VACATONE®, Menadione (Vitamin K₃), DL-Methionine, MOREA® Premix, Niacin USP, Riboflavin Products, Special Mixes, U.S.I. Permadyr, Vitamin B₁₂ Feed Supplements, Vitamin D₃, Vitamin E Products, Vitamin E and BHT Products.

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Research—Kroll

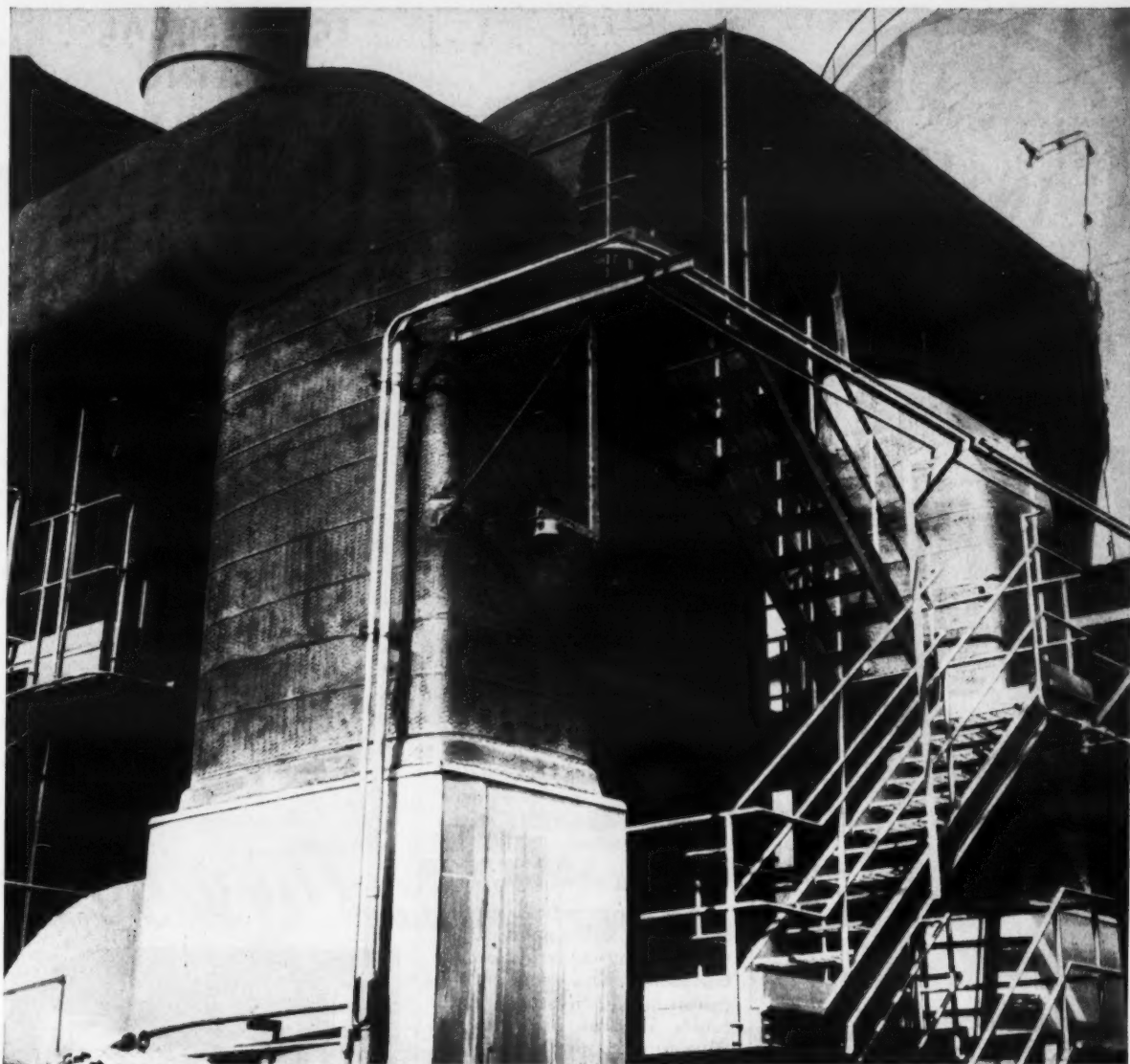
From page 30

Three identically clothed young men were introduced as research chemists, with the sound track saying, "No geniuses here, only a bunch of average Americans working together." Evidently, the executives of this company fight genius. They accept only common men like themselves in their laboratories. These common men are the normal product of our high schools and many of our universities. This "rounded personality" man is not going to cause any team riot with crazy ideas. Handling "prima ballerinas" of research is avoided by a good number of executives who want a quiet life. There is no room for virtuoso performance in their labs.

The output of research laboratories is, in the eyes of many such managers, just a function of the money spent, the quantity of equipment used, and the number of men put on the job. Some planners are supposed to do the thinking — a mere detail — and orders are passed down the line for execution. The stopcocks are opened and out pours an invention automatically — for processing through patent and law departments — machines and men having done their duty.

Ultimate Abrogation of Individual

Institutional inventions are increasingly made by push-button methods in view of obtaining patent rights on new, i.e., unpublished variants of a known theme. That is why managers frequently have such a contempt for inventors. Often, in foreign countries, companies delegate a "mister unknown" to give his name to all patents issued to their laboratories. Such patent mills have created the "ghost inventor" or the "inventor anonymous." This is an ultimate abrogation of the individual; the personality cult is thus eradicated, as it is in

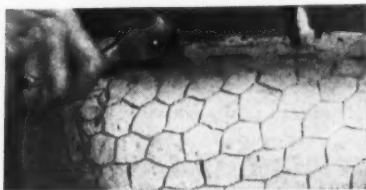


Corrosive atmosphere of humid salt air makes great demands on such exposed items as insulation netting. South-

ern chemical producer solves the problem by using Monel hex netting as on this magnesium chloride shelf drier.

Insulation stays up with Monel netting

Hexagon netting of Monel* nickel-copper alloy stays up in spite of corrosive vapors, moisture, acids,



alkalies and heat that cause other materials to fail.


And just take a closer look at the photo . . . notice how the pliability of ductile Monel alloy helps it fit snug around insulation? It's strong as structural steel! This close-fitting support prevents flaking and peel-off . . . keeps insulation in service longer.

Here's proof of performance: insulation put up with Monel alloy netting

has now been in service for over 12 years. Many plants show cuts of up to 50% in annual cost of maintaining insulation, by using Monel.

Next time you insulate, use Monel hexagon netting — available from Gilbert & Bennett, Georgetown, Conn. They'll be glad to fill in all details . . . supply you with samples and prices.

*Registered trademark

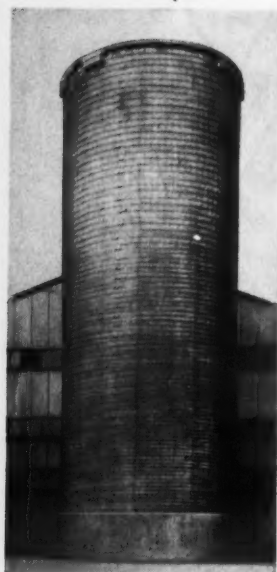
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street  New York 5, N. Y.

INCO NICKEL ALLOYS

Check 5567 opposite last page

For more information on product at left, specify 5566 . . . see information request blank opposite last page.

It's what's
INSIDE
that counts!



Most storage bins
look good on the outside,
BUT...

- ① Have they been built to meet the required method of loading?
 - ② Is the storage area and inside wall built to favor the characteristics of the material to be stored?
 - ③ Will the flow of the material meet the required volume and rate of flow at the point of discharge?
- We at Neff and Fry make it a point to see that all three requirements are in balance.

NEFF & FRY COMPANY
166 Elm St., Camden, Ohio



It's the **STAVE**
that makes the difference

Check 5568 opposite last page

Research—Kroll

From preceding page

Russia where "Popoff does all the metallurgical inventing."

In the USA, fortunately, the inventor's name must be recorded on the patent. Therefore, ghost inventors have not yet appeared. But no wonder that, under such circumstances, the prestige of invention has greatly decreased. Legislators have tried in vain to introduce the "trait of genius" conception in our patent law to cut the flow of trash applications produced by operators of research machinery.

In spite of the good showing of individual inventors under these handicaps, we should be concerned as to whether this much-needed element of progress will survive. Invention by individuals is typical in the beginning of any radically new development — when expenses are still low. In these fields there are still unlimited possibilities. Team patents should be the natural result of development work, done around a primary basic invention, once the semi-commercial status has been reached.

Must Help "Lone-Wolf" Inventor

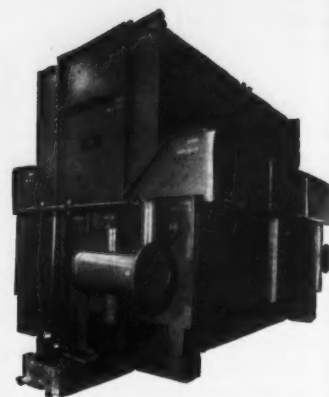
The inventor who wants to go it alone is becoming rarer, to the point of extinction, in our society. Our schools have driven out of the student, and future scientist, any urge of adventure. He prefers, as polls have shown, the security of the organization to the thrill of free jungle life. Also, the wildcatter is being pushed out of his own fields by institutional laboratories. These laboratories experiment with tax-free or taxpayer's money on a massive scale, once they have been tipped off in which direction to go.

Finally, there loom the ominous fights in court which the inventor has to face if his disclosure is an important one. A mob of corporation and sometimes government lawyers may assail him, and infringement litigation may force him to withdraw entirely from his inventing, while he loses his last penny. The individual inventor does not have the life span, the finances, the experience — and often he doesn't have the cour-

ECONOMICAL COOLING OF GASES AND COMPRESSED AIR

Cooling gases or cooling and removing moisture from compressed air, the Niagara Aero After Cooler offers the most economical and trustworthy method. Cooling by evaporation in a closed system, it brings the gas or compressed air to a point below the ambient temperature, effectively preventing further condensation of moisture in the air lines. It is a self-contained system, independent of any large cooling water supply, solving the problems of water supply and disposal.

Cooling-water savings and power-cost savings in operation return your



equipment costs in less than two years. New sectional design reduces the first cost, saves you much money in freight, installation labor and upkeep. Niagara Aero After Cooler systems have proven most successful in large plant power and process installations and in air and gas liquefaction applications.

Write for Descriptive Bulletin 130.

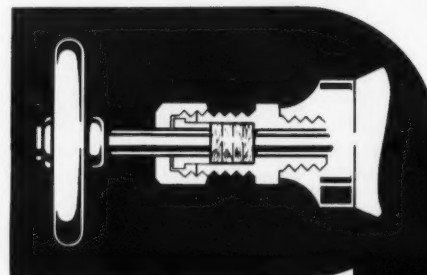
NIAGARA BLOWER COMPANY

Dept. CP-6, 405 Lexington Ave., New York 17, N. Y.

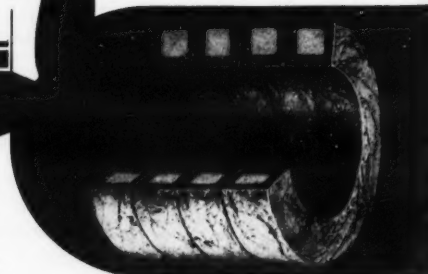
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Check 5570 opposite last page

CHEMICAL PROCESSING

age — to follow through in these fights. And if it is necessary for him to associate with money lenders of any kind, he will have to sacrifice heavily. All great inventors have gone through this. C. M. Hall, the main inventor of aluminum electrolysis, is a typical example.

These are some of the reasons why we must look for some kind of protection for the lone inventor. His services are needed today more than ever before.

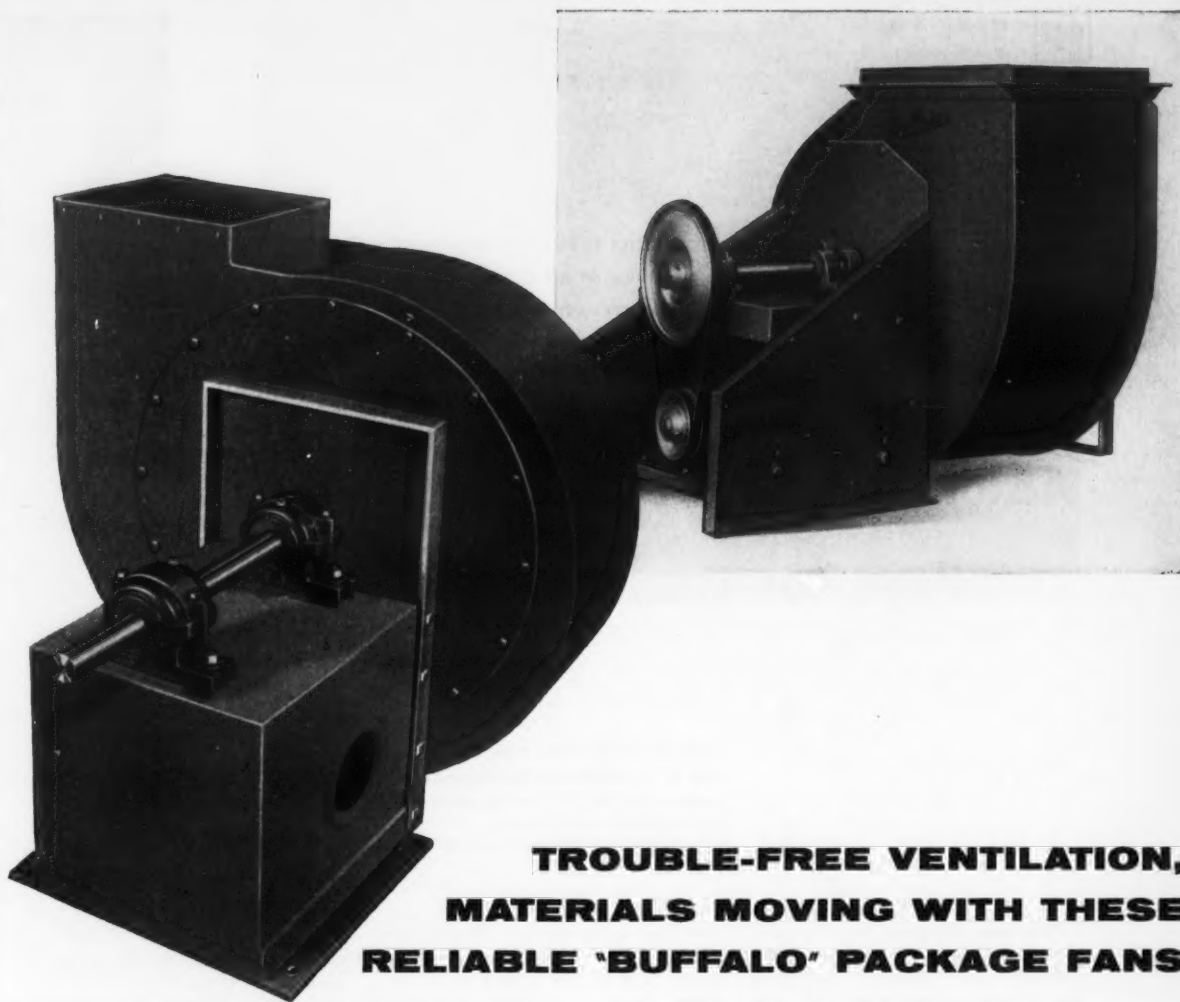
A-power Program

From page 44

atomic energy is the form of power which we should develop for these countries? Why don't we spend several hundred millions to find out if solar energy is not what they need? Maybe power from the H-bomb is the answer. We could spend several hundred millions of dollars annually in these fields. But isn't it obvious that we can ruin ourselves by excessive spending as effectively as we can by letting the Russians gain military superiority over us?

This argument that prestige and the needs of our allies demand a crash civilian atomic energy program is, in my opinion, poppycock. The inference is that the Russians will do it if we don't. But the Russians aren't wasting their funds and substance on "white elephant" reactors. They are leaving such stupidity to us.

The coal industry does not object to a balanced and sane federal atomic energy program. It does object to the existing program as wasteful and unnecessary. It does object to the proposals that the government simply go mad in this field and put the burden on the taxpayers. If civilian atomic power has the promise that its enthusiasts say it has, it will be developed, never fear. Private industry will do the bulk of the work and in plenty of time to meet the power demands of the future.



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"Buffalo" Belted Vent Sets may be the economical answer to your smaller system ventilation needs. Contact your nearest "Buffalo" Engineering Representative, or write for Bulletin 3720-A.



Check 5571 opposite last page



Production of antibiotics is complicated and difficult, with a small fortune at stake at all times. A critical factor is to have uninterrupted supply of process air. After devising a control system to assure this supply and eliminate many anxious moments, Squibb found . . .

Automatic Control of Process Air Pays for Itself in 18 Months

WILLIAM C. CLARKE, Assistant Editor
with **H. F. BOTTCHER**, Superintendent
Maintenance and Utilities Department
E. R. Squibb & Sons Division
Olin-Mathieson Chemical Corporation

Problem: Despite the solution of tremendous problems of engineering and research required for initial production of the "miracle" drug, penicillin, maintenance engineers at E. R. Squibb & Sons were seriously concerned about control of the process-air supply. Any interruption directly affects growth of organisms, increases possibility of contamination, and in some cases, may mean complete loss of the material.

It was necessary to station an operating engineer in the air compressor area 24 hours a day, seven days a week, to adjust suction and discharge valves on the process-air installation manually as the load varied. Every time a fermentation tank was added or removed from the line, this load fluctuation occurred.

Effect of Load Variations

Each changeover of a fermentation tank, if brought about too quickly, could cause one or more compressors to kick-out due to unloading, "surging", or overloading — depending on the fluctuating air demand. And when-

ever this happened — about once a week — extra operating engineers had to be called in from other sections to lend a hand. Production was seriously affected every time this occurred.

To prevent compounding the emergency because of the reduced load conditions, air was discharged into empty tanks to create an artificial load for the compressors. Further, to minimize the possibility of a compressor unloading, air was also diverted into a by-pass to the atmosphere through manually operated valves. Despite the silencer on this line, considerable noise was generated and numerous complaints were received from nearby residents.

When a compressor did "kick-out", it was a costly and difficult procedure to put it back in line operation. At least two men were required to manually open and close the suction and discharge valves, at the same time controlling current to the compressor motor. (It was not uncommon to start one of the four large synchronous motors rated at 1750 hp, 4160 v, and 162 amp several times within an hour,

a practice not recommended by the manufacturer.)

Solution: After extensive investigation, the Squibb Maintenance & Engineering Dept. worked out an automatic control system in conjunction with an instrument manufacturer.

Here's the Control Installation

"Brain" of the control system is a ratio totalizer, a pneumatic force-balance relay that accurately combines two input signal pressures to produce a single output signal. This master pressure regulator acts to maintain the process-air pressure (first input signal) on one of its diaphragms exactly equal to the pneumatic set-point loading (second input signal) on an opposing diaphragm.

Thus, an automatic and constant control is developed to maintain a controlled supply of process air at 25 psig. At the same time, any overloading or surging of compressor motors is prevented by the continuous automatic adjustment between maximum and minimum of the compressor motor load. The at-

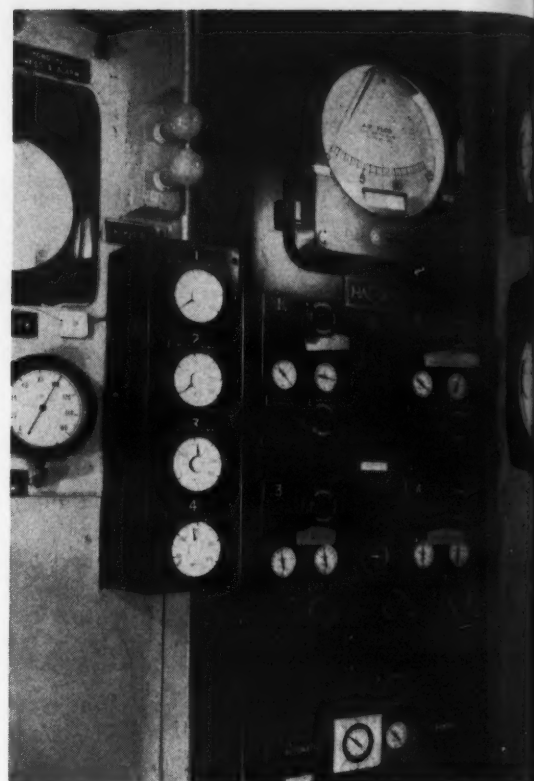
mosphere bleed valve is also controlled to vent the air when process requirements fall below a minimum output.

System Details

Output from the ratio totalizer is transmitted to electro-pneumatic force-balance motor-load regulators. These measure motor load by sensing current changes through a current transformer in one phase of the motor feeder circuit. Force produced by current passing through the coil is balanced against the pneumatic signal by a fulcrum-lever-diaphragm system. A force balance is thus achieved and, through reset action, repeatability is developed. Each motor regulator is calibrated linearly to hold a definite value of motor load for each value of pneumatic signal.

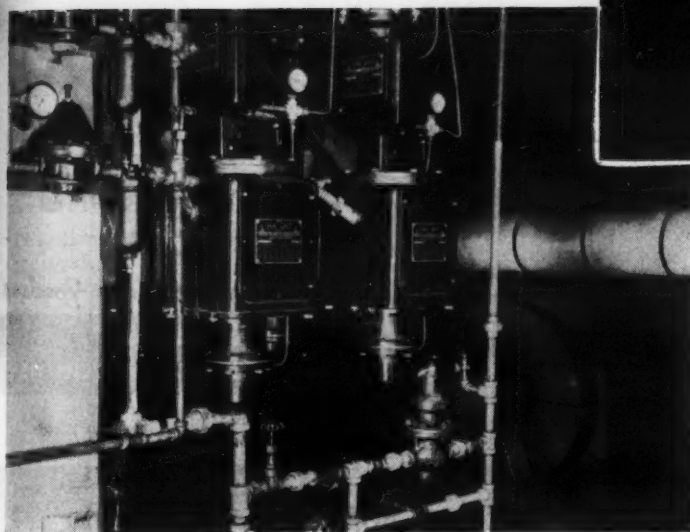
When placed on the job, each motor-load regulator was also calibrated to allow each compressor to operate through its safe maximum and minimum range, and to permit the paralleling of dissimilar compressors.

A ring-balance indicating air-flow shows the operator when

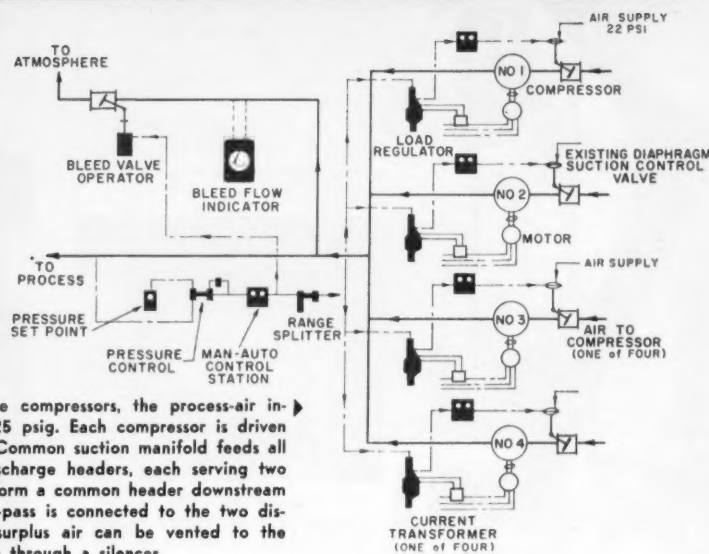
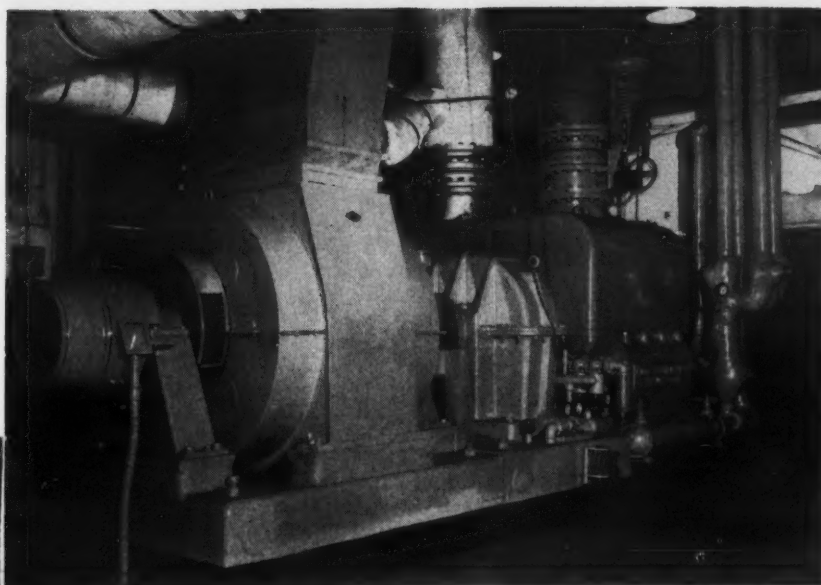


With finger-tip control available if necessary, fermentation vat operators no longer have anxious moments about an uninterrupted supply of process air. Entire system is controlled at this panel. Air-flow meter (at top) indicates air volume vented to atmosphere, determining number of compressors needed. Manual-automatic stations control all valves

Here's one of four 4-stage centrifugal compressors delivering air to fermentation vats growing penicillin. Critical control of process air supplied by units such as these sometimes meant success or failure in the fermentation process



Key components of control system are these motor-load regulators. Any variation in current to motors is converted to a pneumatic signal which limits motor load by regulating air intake at the compressor



Consisting of four 4-stage compressors, the process-air installation delivers air at 25 psig. Each compressor is driven by a synchronous motor. Common suction manifold feeds all four compressors. Two discharge headers, each serving two compressors, combine to form a common header downstream of the aftercoolers. A by-pass is connected to the two discharge headers so that surplus air can be vented to the atmosphere through a silencer

air is bled to the atmosphere, and provides a basis for determining how many compressor units should be in action.

Manual-automatic stations located on the same panelboard as the air-bleed indicator permit remote positioning of the bleed valve and inlet control valves when compressors are added or removed from the system.

An electrical interlock causes the inlet control valve to close automatically when the corresponding compressor is shut down. This is accomplished by use of a three-way solenoid valve which interrupts the con-

trol signal to the suction-valve positioner.

Results: Not only has operation of the compressor system been very satisfactory, but the automatic control system has paid for itself in eighteen months.

Many anxious moments in production of the antibiotics have been eliminated, along with need for an elaborate communication system of horns, warning lights, and direct telephones that had been devised to meet the previous emergencies. No longer is it necessary for the Fermentation Department operators to spring into action whenever a compres-

sor unloads, to turn off air necessary for maintaining sterile conditions within each tank. And most important, production interruptions in the Fermentation Department have been drastically reduced.

Power savings have been considerable because two units now often do the job which formerly required three. It had been frequently necessary to operate more compressors than were actually needed to prevent any one compressor from "kicking-out" due to over-loading. At the same time, excess air had to be "dumped" via the by-pass to the atmosphere.

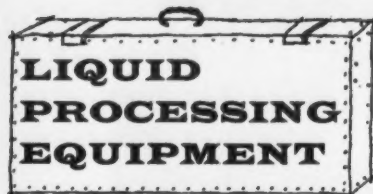
In addition, when three or four units are operating, the controls keep input to the electrical motors at a minimum, thus saving additional power.

Indirectly, large personnel savings have resulted since it has been possible to reassign operating engineers previously stationed at the air compressors to other areas and facilities required by an expansion program.

(Ratio controllers and other components of control system are products of Hagan Chemicals & Controls, Inc., PO Box 1346, Pittsburgh 30, Pa.)

Check 5572 opposite last page.

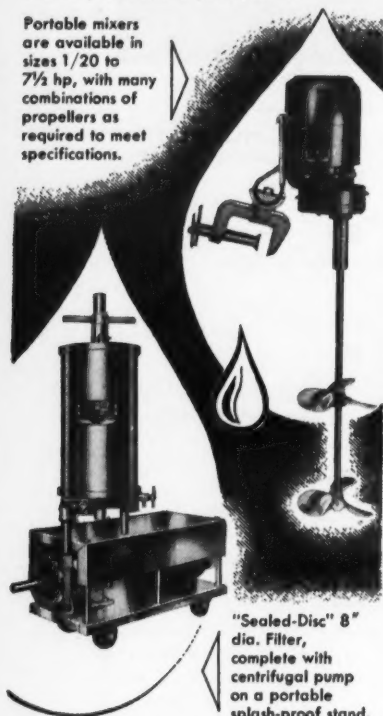
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Check 5573 opposite last page

NEW SOLUTIONS

Catalyst evaporation stopped by combining with molecular sieves

Turns volatile liquid into convenient paste form

Problem: Method of "caging" a volatile, liquid catalyst so that it could be marketed in a convenient paste form, was sought by Silicones Division, Union Carbide Corporation. Consisting of di-tertiary-butyl-peroxide (DTBP), field tests proved that it was ideally suited for curing vinyl silicone rubber. However, because it was a volatile liquid, it presented a safety hazard in plants and shops. It also evaporated so quickly from catalyzed compounds that shelf life was only a few hours.

Solution: With the cooperation of Linde Company, Division of Union Carbide Corporation, the development laboratory perfected a method for



It's a simple matter to add the catalyst in its paste form to silicone rubber on the roller mill

adsorbing the liquid DTBP onto a Linde Molecular Sieve. The latter are tiny synthetic crystalline zeolites which have excellent adsorbent qualities.

The sieves made an ideal carrier, for their alumino-silicate composition permitted incorporation in silicone rubber compounds with no detrimental effects.

Molecular sieves also have the ability to retain the adsorbed material with small losses at storage temperature. At effective curing temperatures, the catalyst is removed almost 100%. These and other qualities made it easy for rubber fabricators to disperse the catalyst into silicone rubber compounds at the mill.

To prepare the catalyst in

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Check 5574A opposite last page

CHEMICAL PROCESSING

NEW SOLUTIONS

the new marketable form, the sieves were loaded with 15% (by weight) DTBP and then compounded with Union Carbide W-96 Gum. This produced the desired stiff white paste which could be shipped to fabricators in one gallon cans.

Results: Marketed as X-1960 curing compound, the catalyst has simplified curing of large masses of rubber. Big parts, like silicone-covered rolls for use in textile, plastics, and paper industries, could be made.

The catalyst permits a one step postcure in place of a long scheduled step cure. In molding gaskets, use of the catalyst not only assures lowest possible compression set, but also minimizes fabrication problems such as scorching.

(Further information about molecular sieves can be obtained from Linde Company, Division of Union Carbide Corp., 30 East 42nd St., New York 17, New York.)

Check 5575 opposite last page.

(Additional information on X-1960 curing compound may be obtained from Silicones Div., Union Carbide Corp., 30 E. 42nd St., New York 17, N.Y.)

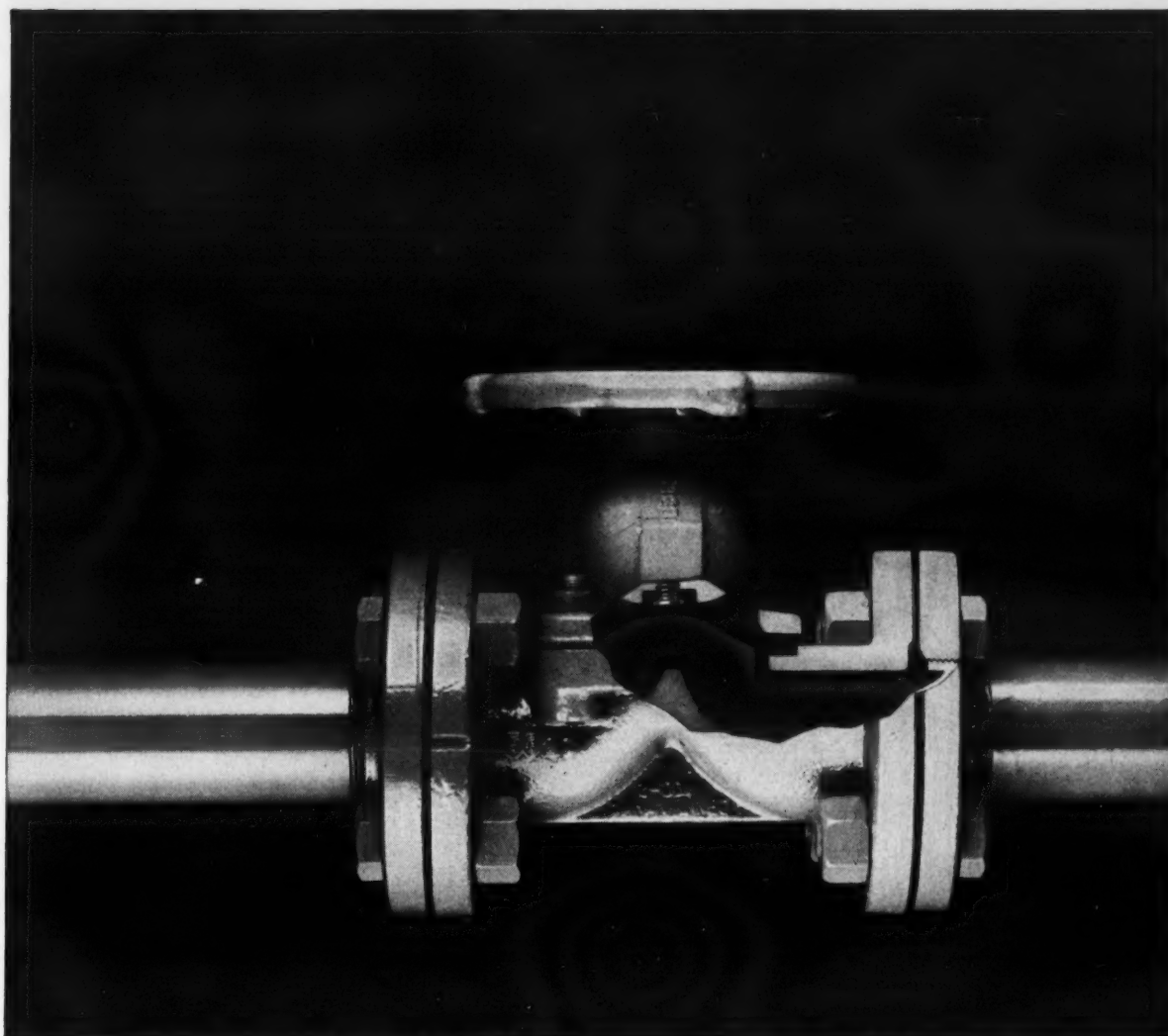
Check 5576 opposite last page.

Plug valve actuators are characterized by dependable service

Problem: Unique malting plant of Albert Schwill and Company in Chicago, Illinois, is built to make possible precise control of processing conditions . . . seven days a week, 24 hours a day. Dependability in plant is important (see *CHEMICAL PROCESSING*, March 1957, page 60).

In steep house, where grain is mixed with water to increase moisture content in seed from 13 to 45% to stimulate germination, controls and actuators for valves are subjected to high-humidity conditions, usually 100%, at 70 to 75°F.

Valves control flow of water and water-grain mixture into steep tanks. They also regulate transfer of steeping



Corrosion protection is continuous in saran lined pipe—liquid never touches metal.

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*It's rigid steel pipe . . . lined with
corrosion-resistant saran . . . keeps shutdowns to a minimum for years*

Looking ahead? Do your plans call for a complete corrosion-resistant piping system with a low total installation cost . . . a system that requires a minimum of maintenance . . . that's simple to modify . . . that can be fabricated in the field?

Then it will pay you in every way to look into the genuine economy of a complete system of saran lined pipe.

First, consider the natural advantages of the new gray saran lining itself. Its lower coefficient of thermal expansion and contraction more closely approaches that of steel. This provides a broader operating temperature range and greater

resistance to thermal cycling. It can be installed in systems with operating pressures from full vacuum to 300 p.s.i. and temperatures up to 200° F. Add to these advantages the immediate availability of saran lined pipe, valves, pumps and fittings and you have an ideal piping system that can be installed without trouble, waiting or hidden costs.

If your plans call for lined tanks, you'll want the advantages of Saraloy® 898 tank lining added to your saran lined pipe system. Get the complete story on how it will pay you to install a complete saran and Saraloy 898 lined system. THE DOW CHEMICAL COMPANY, Midland, Michigan.

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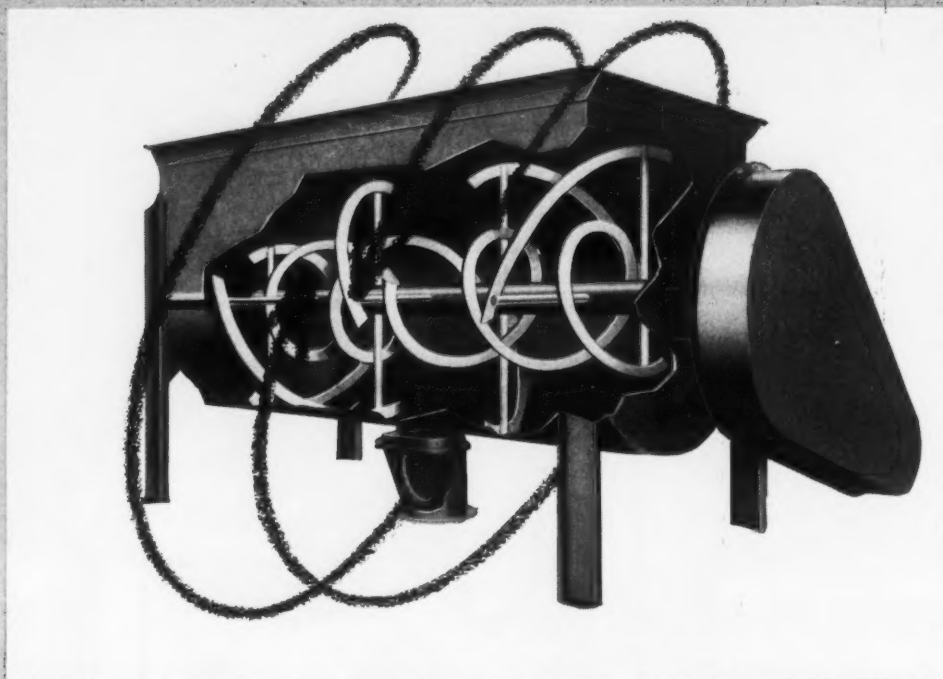
- ☐ Saran lined pipe, fittings and valves.
- ☐ Saran lined centrifugal pumps.
- ☐ Saraloy 898 chemical-resistant sheeting.

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Check 5577 opposite last page



counterflow is key . . .
to rapid, thorough mixing in
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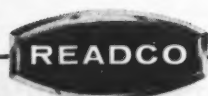
You'll cut processing time, increase mixing efficiency with Readco Spiral Ribbon Mixers

Counterflow action of ribbon agitators accounts for thorough, high-speed blending, assures equal mixing throughout the entire volume.

Designed for batch or continuous mixing or blending of pulverized, granular, dry or wet materials, these mixers are supplied for operation under pressure or vacuum, with or without temperature controlling jackets.

Heavy-duty construction of carbon or stainless steel permits efficient service under long runs and rugged operating conditions. Working capacities range from 1 to 650 cubic feet.

For more information see Chemical Engineering Catalog pages 1483 to 1490 . . . or write direct.



Whatever the mixing job: a READCO mixer!

READ STANDARD

York, Pennsylvania

A Division of
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Check 5578 opposite last page

NEW SOLUTIONS

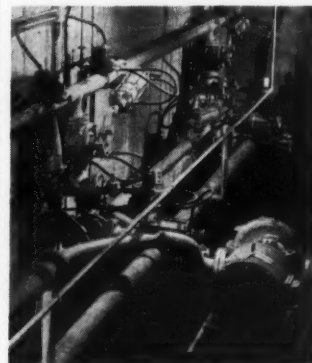
mixture from tank to tank.

With flick of a switch, operator can transfer steeping barley from one tank to another, and when steeping is complete, pump from any tank to any of five growing-kilning compartments for further processing. Each valve is actuated on average of two to three times per day.

Solution: In 1956, engineers at Albert Schwill, in conjunction with consulting engineers, specified lubricated plug valves with solenoid-controlled actuators for flow control in steep house.

Twenty-five, four- and eight-inch plug valves where used, with actuator size determined by valve operating torque required, and line pressure available.

Graphic control panel has



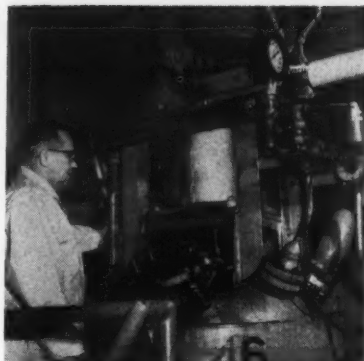
Solenoids and actuators control lubricated plug valves in Schwill's unique malt house. Dependable operation has characterized this installation

built-in interlocks to reduce possibility of error. Lights indicate path traveled by grain.

Results: Plant has been in operation for over a year. Despite high humidity and continuous, 24-hour-a-day service, solenoids and valve actuators have given trouble-free performance. Automatic control of steep-house operations is one step in Schwill's patented malting process which permits precise control of all process conditions.

(Valve actuators and controls are a product of Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Illinois.)

Check 5579 opposite last page.



Reactor for silicone grease preparation. Aryl urea is added from vessel mounted above reactor

High-temperature lubricants possessing a wide operating range bid to reduce the number of failures now found in high-temperature applications, while at the same time cutting the necessity of frequent application. Standard Oil Company (Indiana) found that an aryl urea thickener with . . .

Silicone Fluid Proves Best for Wide-Temperature-Range Grease

THEODORE W. WETT
Assistant Editor

Problem: Numerous fluids and thickeners were investigated by Standard Oil Company (Indiana) in an attempt to find a grease having proper stability, rheological properties, and performance characteristics to meet an increasing demand for wide-temperature-range lubricants. In some cases, particularly in the military, an operating range from -40 to $+450^{\circ}\text{F}$ is encountered.

Conventional greases do not meet these stringent operating requirements. On kiln-car and oven-conveyor bearings, motor bearings for exhaust fans handling high-temperature gases,

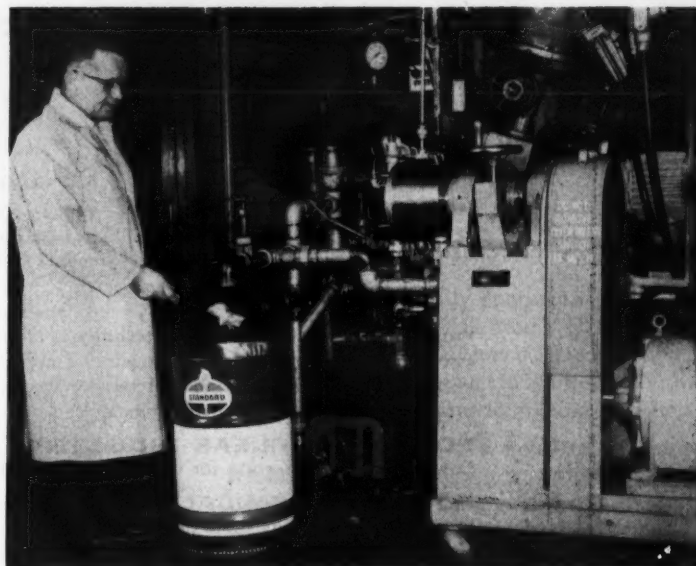
and similar jobs, lubrication engineers usually resort to a multiplicity of lubricants, frequent lubrication, and standby parts in case of failure. Cost of maintenance and replacement runs high.

Among fluids evaluated, petroleum and fluorocarbons had too narrow a liquid range; diesters were liquid over a wide range but too volatile at high temperatures; silicate esters were subject to hydrolysis.

Solution: As the result of an extensive research and development program, a number of polysiloxane fluids were selected as bases for grease. Table II shows a typical fluid.

Even in these silicone fluids, few thickeners were satisfactory for use at 450°F or higher. Soaps were acceptable for high speed and maximum temperatures in range from 350 to 400°F . Inorganic thickeners were not suitable for high-speed use, and those rendered organophilic by organic coatings were unstable above 300°F . Copper phthalocyanine had widest utility but did not give entirely satisfactory service in high-speed ball bearings over 450°F .

Substituted ureas were found to have most of the desired properties. For silicone-base grease, thickener is formed by reacting an aryl amine with an aryl isocyanate at about 200°F . Product is then filtered and mixed with silicone fluid, consistency adjusted, additives included, and batch heat-treated at 400°F . After cooling, entire batch is



Final step in grease preparation. Product functions satisfactorily from sub-zero to 450 or 500°F

Photos by CP Staff

Table I
Typical Characteristics
Supermil ASU Grease M-40

Dropping point ($^{\circ}\text{F}$, ASTM)	above 600
Worked penetration (ASTM)	290-320
Penetration after 100,000 strokes	290-330
Bearing test (hr at 450°F , ABEC-NLGI tester 10,000 rpm)	500
Apparent viscosity, poises (shear rate 20 sec $^{-1}$ @ -40°F)	15,000

Table II
Properties of Typical Silicone-base Fluid Used to Make Greases

Viscosity (centistokes @ 25°C)	100-150
Flash point ($^{\circ}\text{F}$ min)	575
Freeze point ($^{\circ}\text{F}$)	-50
Gel time (hr at 500°F)	1000-1500
Viscosity-temperature slope is relatively flat.	

again filtered and passed through a Tri-Homo colloid mill to assure complete dispersion.

Results: Mechanical stability and rust inhibition of the silicone greases resemble those of conventional greases. They function satisfactorily from sub-zero to 450 or 500°F . Relubrication interval is estimated to be one month where service temperature is in range of 450°F to about six months where operating temperature is in range of 325°F . Greases have good rheological properties over a wide tempera-

ture range. They are high-melting and thermally and chemically stable. Typical properties are given in Table I.

(Polysiloxane fluids are a product of Dow Corning Corporation, Midland, Mich.)

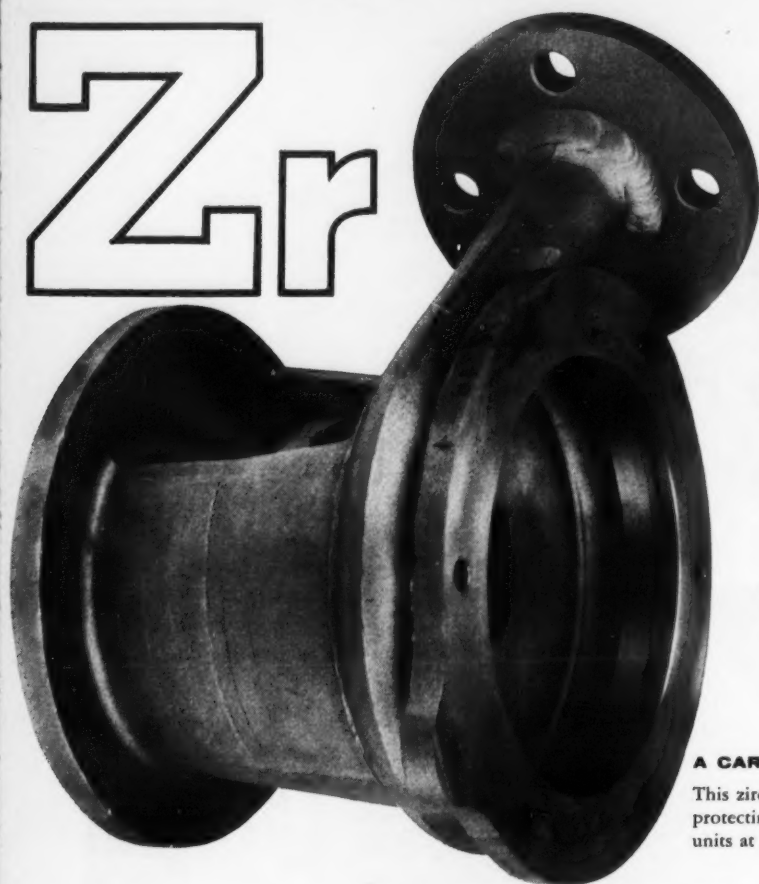
Check 5580 opposite last page.

(For more information on Supermil ASU greases contact Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.)

Check 5581 opposite last page.

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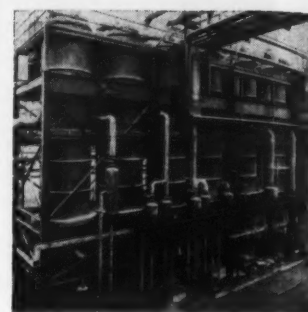
Production Pioneer of ZIRCONIUM

CARBORUNDUM

REGISTERED TRADE MARK

Check 5582 opposite last page

NEW SOLUTIONS



Giant evaporator ...

... concentrates waste liquor from 400 tons of pulp per day. Installed at Longview Fibre Company's Longview, Washington, mill, the septuple-effect unit evaporates 6.3 lb water for every lb steam it uses.

Solids content of liquor is boosted from 16 to 55 percent. Product is burned as fuel. Total heating surface of evaporator is 66,500 sq ft. Unusual design feature is use of three vapor heat exchangers which cut steam usage by 5500 lb/hr.

(Evaporator was designed and constructed by Buřlovak Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.)

Check 5583 opposite last page.

Diatomite filter aids speed hot tall oil filtration job

Remove gummy contaminate from finished core oil

ALBERT REECE, Plant Manager
Archer-Daniels-Midland Co.
Cleveland, Ohio

Problem: Esterified tall oil was contributing a gummy carbonaceous precipitate to finished foundry core oil produced at Archer-Daniels-Midland Co., Cleveland, Ohio. Plant is major producer of core binders used in the foundry industry to form stronger core sand.

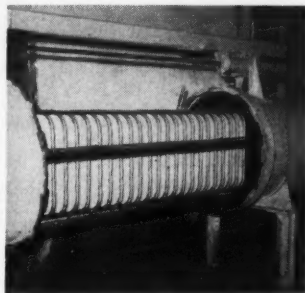
Solution: Laboratory investigation showed that by using a porous filter aid the precipitate could be removed by filtration. Accordingly, 200 lb of diatomite filter aid (Celite

545) were added to 8000 gallons of core oil, agitated, and filtered through an existing plant filter. Total filtration time was about 2½ hours.

Although the results were satisfactory, further lab studies revealed that faster filtration, and even better results, could be obtained if the esterified tall oil, which contains the solids, was filtered separately.

A 200-sq-ft vertical, stainless steel leaf filter with a retractable-leaf assembly was installed for this purpose. Stainless 24 x 110 wire mesh leaf is the filter media.

At the start of operations, it was found necessary to precoat the filter with a liquid different from esterified tall



Retractable leaf-assembly on filter makes cleaning job easy, cuts downtime

oil. Since batch formulations for foundry core oil differ, it was important to devise some method of emptying the filter after precoating, to prevent contamination.

A special asbestos fiber diatomite filter aid (Fibra-Flo 11C), provided a precoat strong and retentive enough to permit draining and air blowing without having the cake drop off the leaves.

When starting a batch, 25 lb of the asbestos fiber diatomite filter aid are added to the precoat tank. After 10 minutes precoating, filter is drained and air blown.

Following this, 2200 gallons of 210°F esterified tall oil containing ¾ of 1% Celite 545 diatomite filter aid, is started through the filter. It takes about 30 minutes to filter, flowing through unit at rate of 22 gal/ft/hr. This can be followed by an additional 2200

Piping made permanent

...with Teflon® at its best



- **Inherent thermal equilibrium** of housing and liner prevents fatigue cracking of liner at the flare.
- **High density, non porous liner** is universally inert and corrosion-proof.
- **Will not collapse under negative pressure** — even at high temperatures.
- **Will not corrode, break, or wear** — no maintenance, no downtime.
- **Non-contaminating** — cannot cause batch spoilage.

The ideal, universally corrosion-proof system for fluid service to 500° F—that's Fluoroflex®-T Type S lined steel piping. It has a Schedule 40 steel housing and seamless, impervious liner of Fluoroflex-T, a special high density compound of virgin Teflon.

Liner is formed into housing by an exclusive Resistoflex process which dynamically balances thermal expansion-contraction between housing and liner. Unaffected by thermal shock...no fatigue stress at flare.

Chemically as well as physically durable, Fluoroflex-T piping is completely inert to virtually all known chemical and corrosive solutions.

Send for bulletin which gives full specifications. RESISTOFLEX CORPORATION, Roseland, New Jersey. Other Plants: Dallas, Tex.; Burbank, Calif.

® Fluoroflex is a Resistoflex trademark, reg. U.S. pat. off.
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Eliminates troublesome gaskets. On both pipe and fittings, the integral Fluoroflex-T liner covers the full gasket face of the flange... positively seals and prevents fluid-to-metal contact.

RESISTOFLEX

Complete systems for corrosive service



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Check 5584 opposite last page

VANTON *notes on fluid handling*

PUMPS • PIPE • FITTINGS • VALVES

High-Temperature Polyethylene Increases Sealless Pump Application Range

Marlex 50 Polyethylene*, the latest plastic material adapted for use in the Vanton Pump, is a new material with wide corrosion-resistant properties, which withstands temperatures up to 260°F.

Characterized by a close, dense molecular structure and a long molecular chain length, Marlex possesses a high tensile strength, low permeability, excellent impact strength, and a high degree of crystallinity. Whereas conventional polyethylene is limited to services under 140°F., the new Marlex 50 Polyethylene can handle extremely corrosive fluids at temperatures up to 260°F., enabling it to withstand sterilization and boiling without damage.

These desirable characteristics expand the application of the Vanton plastic pump line to a broad range of corrosive fluids, abrasives, slurries, and other solutions which must be pumped without contamination at elevated temperatures.

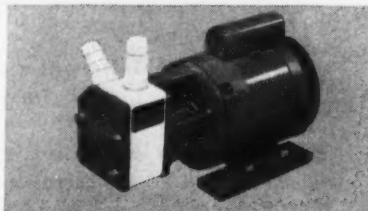
The new Marlex 50 Vanton Pump, like all other Vanton self-priming pumps, is available in a wide variety of interchangeable plastic body blocks, and rubber or synthetic flex-i-liners; and in capacities of 1/4-40 GPM. For more information, circle #512 on coupon below.

*Reg. trade mark of Phillips Petroleum Corp.

Vanton Design Eliminates Stuffing Boxes, Shaft Seals

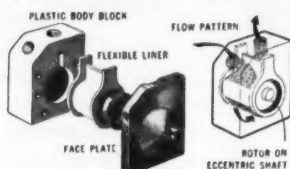
Basic Vanton design avoids the problems associated with stuffing boxes and shaft seals by eliminating the seals themselves! All fluid moves in a channel formed

Teflon* Sealless Pump Now Available In Close-Coupled All-Purpose Portable Motor-Pump Unit



Portable Vanton Motor-Pump Unit, with convenient handle and platform, in variety of plastic constructions, has wide application for general utility, standby, and process applications

between molded plastic body and synthetic interliner. No liquid touches metal. Pumping mechanism is rotor, inside the liner, mounted on eccentric shaft. At each revolution it creates a progressive squeeze action on the fluid trapped between



the liner and the housing. Available in a variety of plastic materials, including Teflon* and Kel-F Elastomer**. For further information, circle 511 on coupon and mail to Vanton. Or, for a demonstration of this unusual motor-pump unit, see your nearest dealer.

*Reg. Trade mark of E. I. DuPont.

**Reg. Trade mark of Minn. Mining & Mfg. Co.

No-Shaft-Seal Principle Eliminates Leakage and Corrosion, Minimizes Maintenance for Wide Range of Pumping Problems

Here at last is a portable all-purpose motor-pump unit to handle all your 1/4-10GPM pumping problems! This pump's unusual no-stuffing-box design eliminates leakage, corrosion, and contamination, and minimizes maintenance. Provided with a convenient handle, and mounted solidly on a platform, this unit will find wide use in pumping all kinds of corrosive, abrasive, pharmaceutical, and plain ordinary industrial fluids encountered in plant operations.

This brand-new motor-pump model is an adaptation of the unique Vanton Plastic Pump that has been performing so outstandingly under the most difficult pumping situations to be found in the chemical industry today. Vanton has taken the basic design principle of this pump (NO STUFFING BOX OR SHAFT SEALS) and by skillful engineering has produced a portable motor-pump unit that for versatility, convenience, and corrosion and abrasion resistance has no equal on the market today.

PUMP PERFORMANCE DATA⁽¹⁾

MODEL NO.	CAPACITY Gals./Min. ⁽²⁾	OPERATING PRESSURE RANGE lbs./sq. in. gauge	
		INTERMITTENT	CONTINUOUS
2	0.33	0-20	0-10
6	1.0	0-25	0-15
12	2.0	0-30	0-25
18	3.0	0-35	0-30
30	5.0	0-45	0-30
60A	10.0	0-40	0-30

⁽¹⁾1750 rpm, 1/4 H.P. all models, except 60A (1/2 H.P.)

⁽²⁾Water at 70° F., against zero head.



VANTON PUMP
and Equipment Corp. • Hillside, N. J.

DIVISION OF COOPER ALLOY CORP.

Check 5585 opposite last page

NEW SOLUTIONS

gallon batch before all the cake space in filter is filled. Filter is then drained, blown by air, and is ready for cake removal.

Results: Use of the two diatomite filter aids completely removes suspended solids from the esterified tall oil. Finished foundry core oil is no longer plagued by presence of the gummy carbonaceous precipitate.

The stainless steel leaf filter does the filtration job smoothly and efficiently. Principal value of this type of unit is the ease with which it can be cleaned, re-precoated, and put back into production. Total downtime between pre-coating operations is less than one hour.

(Celite 545 and Fibra-Flo 11C diatomite filter aids are produced by Johns-Manville Products Corp., 22 East 40th St., New York 16, N. Y.)

Check 5586 opposite last page.

(Vertical, stainless steel leaf filter is product of Process Division, Bowser Inc., 1302 East Crayton Ave., Fort Wayne 2, Ind.)

Check 5587 opposite last page.

Stops contamination and product loss from shaft seal

Segmental carbon rings protect purity of pharmaceutical

Problem: Standard stuffing boxes filled with soft packings were a potential source of contamination at Merck & Co., Inc., Elkton, Va. High-grade pharmaceuticals cannot tolerate any degree of foreign matter. Various compounds are mixed by agitators under about five psi.

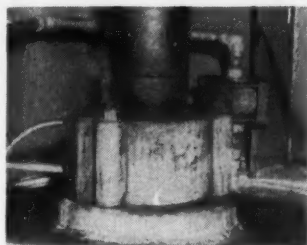
Steam was led into packing for sterilization purposes. Sterilizing steam formed condensate which tended to run down agitator shaft, carrying graphite and bits of packing material with it. If this material found its way into reactor, entire batch could be contaminated and expensive product lost.

Solution: At suggestion of

NEW SOLUTIONS

packing manufacturer, Merck installed a metal packing case using segmental carbon rings. Although carbon seal rings have been used for years as a labyrinth packing, the best that these rings could do was prevent excessive steam loss.

New design is a segmental ring with keyways to keep ring from rotating with the rod. Rings are fitted with small bronze caps to maintain support and to strengthen outside diameter while main-



Carbon ring packing on fermentor has completely eliminated any possibility of product contamination

taining superior wearing and non-contaminating characteristics gained by using carbon inner rings.

Two rings are dowelled together to stagger joints. A cross-wise slot is milled in to prevent rotation. A metal case with three annular grooves is fitted with a pair of rings in each groove. Keys which prevent rotation of rings are held in place within grooves by cap screws reaching through outside of case.

Lower pair of rings prevents loss of live steam to kettle and upper section prevents loss of live steam to atmosphere. Sterilizing steam is admitted to middle groove at a temperature sufficiently high to kill all injurious bacteria. Steam and condensate are piped away from case. Case is split for easy installation and ring replacement.

Results: Packings have been so successful that not a single batch of costly pharmaceutical has been lost due to contamination through seal.

(Packing was supplied by Garlock Packing Co., Palmyra, N. Y.)

Check 5588 opposite last page.

Just off the Press! SEND FOR YOUR COPY

of this 48 page Application Booklet for
SEPARATION, MAGNAMATION and VIBRATION EQUIPMENT!



48 PAGES!

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Big new comprehensive booklet shows complete line of Eriez non-electric magnetic equipment including newly-developed units for separation, vibration and automation needs.

and purify ferrous from non ferrous materials. In addition, you'll discover other applications of Eriez equipment—from Magnamation units that convey, control and elevate all types of metal parts to electro-permanent magnetic vibratory feeders that accurately and automatically move tons of material each hour. You'll find that separation or materials handling problem of yours inside—and see how Eriez Separation, Magnamation or Vibration Equipment can solve it!

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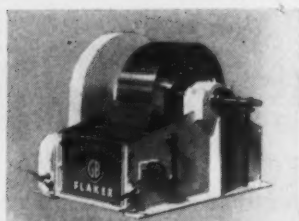
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Eriez, leader in design and research of magnetic equipment, introduced most of the types of permanent, non-electric magnetic units on the market today. Specifically, we build standard lines of magnetic separation equipment and in addition, design and build special Magnamation components to magnetically convey, transfer, control, elevate, re-position, hold or reorient basic ferrous materials or finished parts.

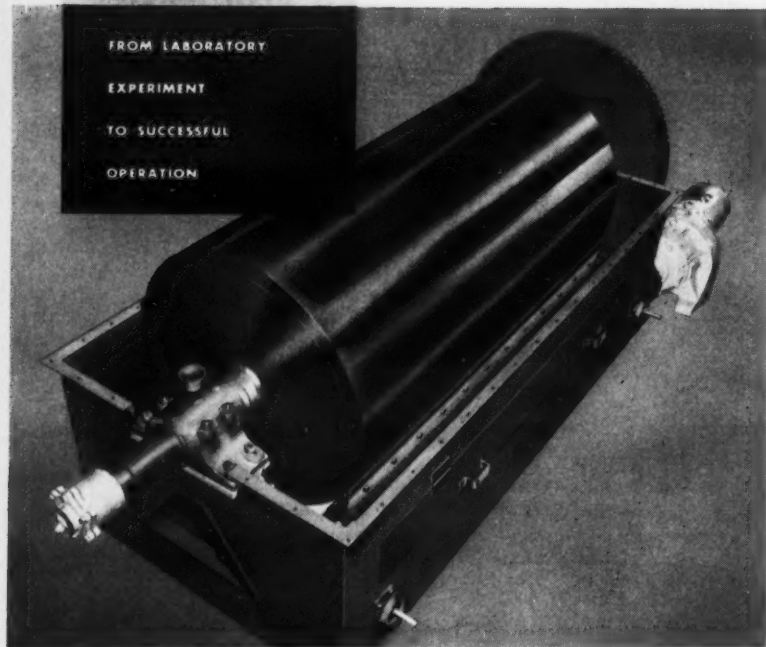
Our laboratory and field staffs, backed by the know how and versatility of solving countless magnetic problems of all types, are among the most skilled in this line. They are continually developing and perfecting new models to meet the ever changing needs of industry. By studying your particular problem, they will recommend the lowest cost magnet in proper size and strength to do the job best.

Whatever your product—and whatever your magnetic problem—you'll find the answer in this handy booklet "Magnetic Ideas from Eriez". Send for your copy today.

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FROM LABORATORY
EXPERIMENT
TO SUCCESSFUL
OPERATION



Your flaking problem large or small is our interest too

The commercial scale flaker, shown without the upper half of its hood in place, is fitted with a double wall drum.

Fixed directional flow of cooling medium at a predetermined velocity is provided by this design. Let the Research Engineers of G-B study your problems.



GOSLIN-BIRMINGHAM
MANUFACTURING CO., INC.
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FILTERS • EVAPORATORS
PROCESS EQUIPMENT
CONTRACT MANUFACTURING
including HEAVY CASTINGS

Check 5590 opposite last page

NEW SOLUTIONS of processing problems



Photos By CP Staff

Faced with an annoying quality control problem, Reichhold Chemicals proves that perseverance pays. Leaving no stone unturned in their determination to produce a top-quality product, company finds that . . .

haze in plastics disappears with 'depth-type' filtration

SAMUEL W. SMALL, Plant Manager
Reichhold Chemicals, Inc.
South San Francisco, California
as reported by CP Staff

Problem: Method of removing contaminants from styrenated alkyds and phenol-formaldehyde-type resins was sought by Reichhold Chemicals, Inc., South San Francisco, California.

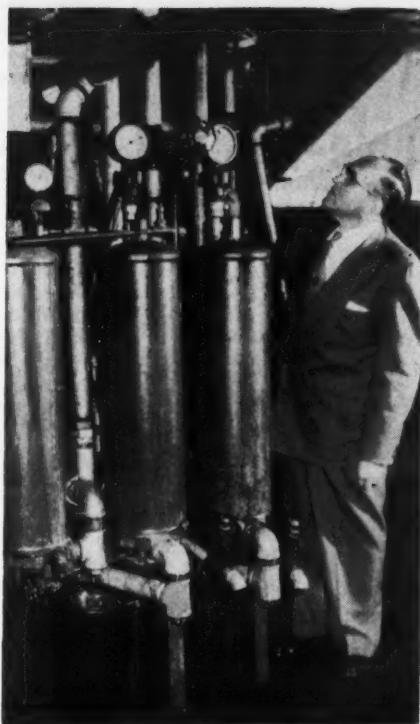
The hot, viscous, difficult-to-filter products have a vis-

cosity of about 5000 SSU (Gardner Holt-W) at 25°C. Various kinds of filters available in the plant were tried, but none produced the crystal-clear, amber-colored end product that was desired.

Solution: Company tried a cartridge-type filter system

Note small floor space needed for filtration at Reichhold. Hot viscous resin flows to filters by gravity from tanks mounted above units

Samuel W. Small, Reichhold plant manager, checks pressure on the three filters



using replaceable, "depth-type", cellulose filter elements. Units are simply constructed and easy to maintain. Product flows into a cylindrical housing containing a series of the "depth-type" filter elements. Particles are removed from the liquid throughout the depth of the cartridge, rather than at the surface only. Clear product is discharged through hollow-core center.

The cellulose in the cartridge is bonded with a melamine resin. Because of the filter element's graded-density construction, dirt-holding capacity is greatly increased, and service life is extended without need for adding filter media during the filtration cycle. Cartridges can withstand maximum temperature and pressure of 250°F and 125 pounds per square inch.

One filter containing 18 cartridges is used for each of the three feed tanks in the plant. Resin is pumped to the filters. Filtration is conducted at 20-30 psi at rate of 10.8 gallons per minute.

Each batch consists of approximately 13,000 lb (2250 gal) resin. Particles down to 5 microns in size are removed 100 percent.

Results: On the first trial with the replaceable cartridge filter system, the contaminants completely disappeared in the finished product, and haven't been a problem since. Plant production figures show that from 100,000 to 150,000 lb of product per filter can be processed without changing the cartridges. Units occupy small amount of floor space. Cartridge changing is fast, simple, and neat.

(Model 6AX3-B-2 filter with Micro Klean cellulose cartridges is product of Cuno Engineering Corporation, Meriden, Connecticut.)

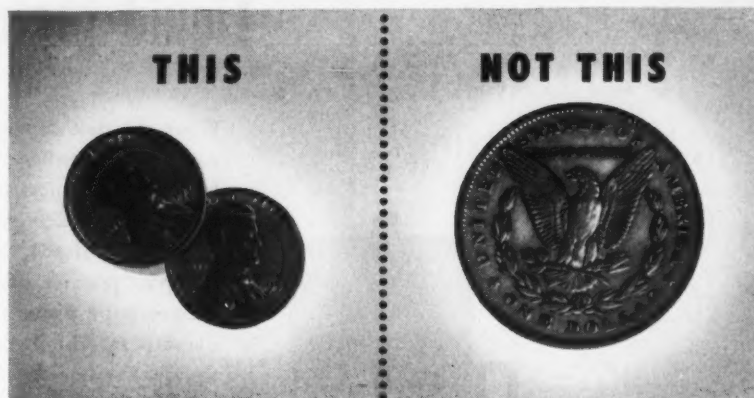
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(Further information about resins may be obtained from Reichhold Chemicals, Inc., 525 North Broadway, White Plains, New York.)

Check 5592 opposite last page.

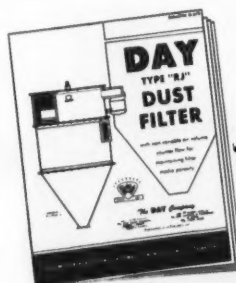
DAY

DUST CONTROL NEWS



DAY "RJ" Dust Filter Operates for Pennies NOT Dollars

DAY has simplified dust filter design without sacrificing high efficiency. That's why there's so much interest in the DAY "RJ" dust filter. Simplified design means fewer parts, lower operating costs and less maintenance. With the DAY "RJ" costly compressed air, complicated valves, timers, shaking or rapping devices are NOT required. The entire counter air flow mechanism (the reason for the "RJ's" continuous, high efficiency) is operated by one small motor which varies from ½ h.p. to 1½ h.p., depending upon the model selected.



The DAY "RJ" dust filter will handle light or heavy dust laden air streams. It filters fine, coarse, abrasive or non-abrasive dusts with outstanding efficiency ratings. Recent orders for 49 DAY "RJ" units came from 31 companies already using this filter — substantial proof of owner satisfaction. For complete specifications write to DAY for Bulletin G-579.

For DAY office nearest you refer to our advertisement in Chemical Engineering Catalog.

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EQUIPMENT ONLY OR A COMPLETE SYSTEM

Check 5593 opposite last page

Replace with **PULSAFEEDER** for Trouble-Free Liquid Metering

NO LEAKAGE
NO CONTAMINATION
NO PRIME LOSS
NO STUFFING
BOX

When the time comes to replace the chemical pump in your process, replace with a **PULSAFEEDER**—the leak-proof chemical pump that has no stuffing box or other leak-likely seal.

Lapp Pulsafeeder is a combination piston-diaphragm pump... positive displacement is achieved by a reciprocating piston pumping a hydraulic oil against a diaphragm. This hydraulically balanced diaphragm isolates the liquid being pumped from the pump's working parts—eliminates need of stuffing box or running seal—prevents product leakage and contamination. Pumping speed is constant, variable flow results from variation in piston-stroke length... controlled manually by hand-wheel, or, in Auto-Pneumatic models, by instrument air pressure responding to any instrument-measurable process variable.

WRITE FOR BULLETIN 440
with typical applications, flow charts, description and specification of models of various capacities and constructions. Inquiry Data Sheet included from which we can make specific engineering recommendation for your processing requirement. Write Lapp Insulator Co., Inc., Process Equipment Division, 3500 Poplar Street, Le Roy, N. Y.

Lapp
PULSAFEEDER
CONTROLLED-VOLUME
CHEMICAL PUMP



NEW SOLUTIONS

Remove oil and rust economically from condensers

Process permits reclaiming of valuable units

Problem: Condensers from hermetically sealed refrigeration assemblies that had been returned to the factory for various reasons represented a large capital investment at General Electric Co. Units could be scrapped, in which case the loss would constitute a high percentage of value already invested. Or they could be cleaned and reused, thereby keeping losses to a minimum.

In order to reuse the condensers, it was necessary to remove all foreign material without opening them. Contaminants consisted primarily of a tenacious film of oil and dirt over a base of iron oxides. Also, shell and tubes had to be free of all chemical cleaning compounds except possibly a thin phosphate coating. Since visual inspection was impossible, final process had to insure cleanliness with a very high degree of certainty.

Condensers are essentially circular tube and shell heat exchangers. Cold water is circulated through the finned copper tubes and Freon 12 or 22 is condensed under pressure in the steel shell. Access to shell is available through Freon entry and exit ports only.

Solution: A number of organic and inorganic degreasing agents were tried to remove oil, grease, and dirt. A 10% solution of NaOH, with 0.1 to 0.2% of a nonionic wetting agent added, was selected. Solution was heated to 160°F and circulated continuously through the units for 10 minutes. They were rinsed with hot water, drained, and dried with 50-psi air at 225°F.

In view of stringent contamination restrictions, and presence of copper, cleaning agents evaluated for iron oxides removal were restricted to those free of chlorides and sulfate ion. Most effective for-

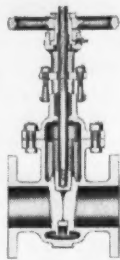
To page 104

Check 5594 opposite last page

PROCESS PIPING POINTERS

High-nickel / high-chrome stainless steel valves score on sulphuric acid

Especially developed for sulphuric acid at elevated temperatures, Craneloy 20" valves are giving outstanding performance on a wide range of concentrations. Gate valves feature unique split-wedge rotating disc seating. Sizes range from 1/2 to 12 in. Globes and flanges also available. Fully detailed in Circular AD-2080. See below.



New edition: "Flow of Fluids through Valves, Fittings and Pipe"

One of the best known, most valuable piping engineering handbooks. Gives the newest available information on the theory of flow, with all auxiliary data—formulas, nomographs, tables and procedures—for solving any but the most unusual fluid flow problems. Organized for easy reference; durably bound. Free to process piping engineers. See below.

New design for double-blocking—one gate valve holds both pressure and high vacuum



At a Texas butadiene plant, this new flexible wedge disc gate is holding 20 psi. steam at one side of the disc, and 24-in. mercury vacuum at the other. Periodic tests show no leakage across seats month after month under constant cycling. One valve does the work of two. See next page.

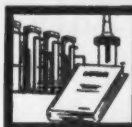
For literature, or data on product listed above, please contact J. E. Bradbury, Manager, Chemical Sales Dept. No obligation.

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PLUMBING • KITCHENS • HEATING • AIR CONDITIONING
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Check 5595 opposite last page

JUNE 1958



processing and engineering data

229

Pressure drops for steam through valves and fittings

D. S. DAVIS

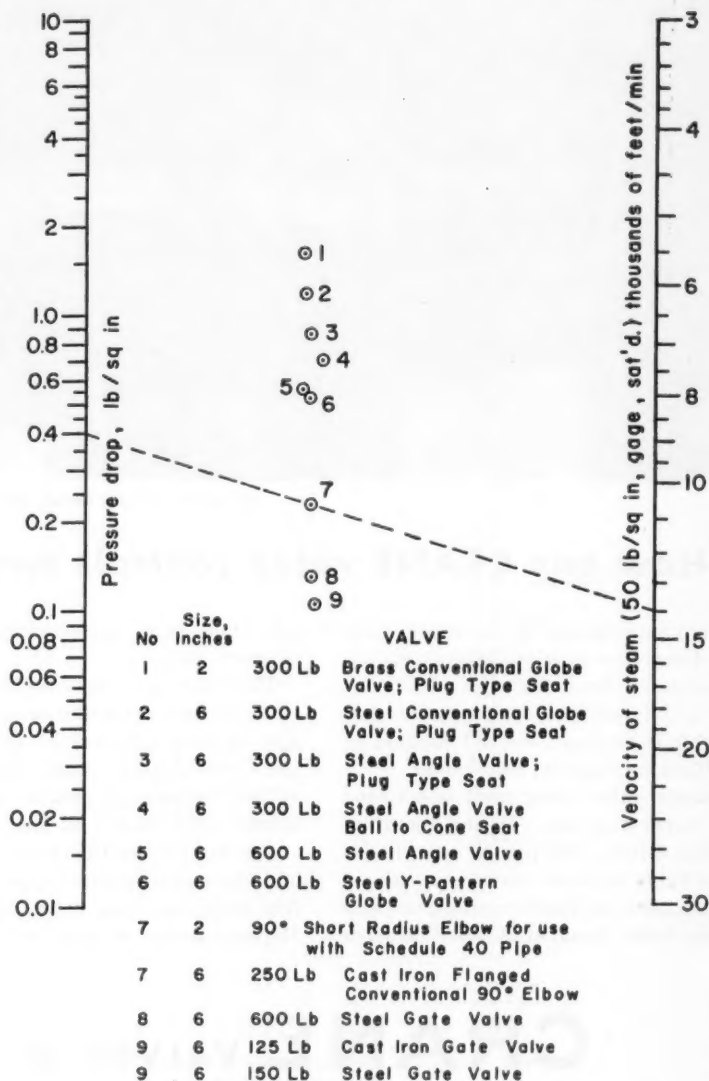
Head, Dept. of Pulp and Paper Technology
University of Alabama

When saturated steam (50 psig) flows through valves and fittings, one can estimate pressure drops by use of accompanying nomograph, which is based on reliable data¹ and was constructed through well-known methods.²

Broken index line shows that when steam (50 psig, saturated) flows through 6-in line, 250-lb cast iron, flanged, conventional 90° elbow at rate of 14,000 fpm, a pressure drop of 0.4 psi should be expected.

LITERATURE CITED

- 1) "Flow of Fluids through Valves, Fittings, and Pipe," pp 2-5, Technical Paper #410, Crane Co., Chicago, 1957.
- 2) Davis, D. S., "Nomographs and Empirical Equations," Chap. 10, Reinhold Publishing Co., New York, 1955.



Pressure vs. vacuum—one valve holds both in line



Gauge test of Crane flexible wedge disc gate valve shows no leakage around disc.

How one CRANE valve controls two-fluid process

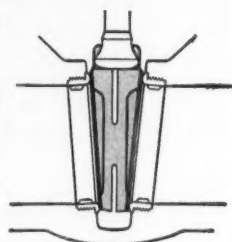
To prevent intermixing of steam and very light hydrocarbon in a butadiene production process, the Texas Butadiene & Chemical Corp., Channelview, Tex., uses only one valve. This is unusual; the old method of double blocking required two valves.

The single valve being used is a Crane flexible wedge disc gate. In the operating cycle, this 6-inch, 400-pound air-cylinder operated valve opens or closes every seven to nine minutes. In closed position, one side of the disc holds steam at 20 psi. The other

side holds light hydrocarbon at 24 inches mercury vacuum.

This dual service, combined with constant cycling, is beyond an ordinary wedge gate or plug type valve. But not beyond the Crane flexible wedge disc! It has prevented leakage and product contamination month after month on this tough service.

For full information about the efficiency and obvious economies of using Crane flexible wedge disc gate valves, see your Crane Representative or write to address below.



Positive wedging principle of Crane flexible wedge disc gate valve.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

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NEW SOLUTIONS

From page 102

mulation found had the following composition (by weight):

phosphoric acid, %	43.3
H ₂ O, %	6.1
methyl Cellosolve, %	50.6

After some production experience, additional methyl Cellosolve was added to reduce time required for draining and drying. Units were rinsed, dried, and then given a thin phosphate coating with Oakite #47 solution. Nonionic and cationic detergents (0.1% each) were added to all solutions to promote wetting.

Results: Process was installed as a semi-continuous operation. A number of sample shells have been cut open for visual examination. In every case they were found to have been completely cleaned of oil, grease, dirt, and rust. Process control is simple and economical. At present, solutions which have been depleted are discarded. However, provision has been made for recovery if production rates increase sufficiently.

(Process was developed by Dr. Joseph Gaynor, General Engineering Laboratory, General Electric Co., Schenectady, N. Y.)

Stops manual handling in 'broke' paper recovery system

Specially designed conveyor takes paper to repulping

Problem: A continuous system which would automatically take waste or "broke" paper away from both finishing room and paper-making machine as soon as it was made, was required by P. H. Glatfelter Co., Spring Grove, Pa. This would eliminate pile-up and assure uniform supply of pulp to avoid unnecessary production halts.

Solution: A specially designed, 101-ft conveyor was installed to carry broke to recovery system. Conveyor is positioned directly below last quarter of paper-making ma-

To page 106

Regulate Bulk Feeding

and prevent
production
choke-ups!



DRAVER FEEDERS

now available with
automatic timing controls

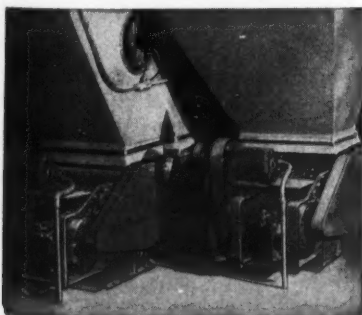
Prevent overloading of grinders, sifters, mixers and other production machines.

Accurate Draver Feeders regulate the flow of dry free- or nonfree-flowing products . . . keep processing equipment operating at most efficient capacity . . . prevent machine failure and downtime. Timing controls are available, for feeding to continuous processes at automatic intervals.

Dependable and durable, Draver Feeders are made in more than 100 sizes and models, with capacities from minute quantities up to thousands of pounds per hour. Original cost and operating expense are low, compared with the production losses they prevent.

What is your bulk feeding problem? Write our engineering department for a solution, without obligation.

Draver "Micro-Master" Feeders, mounted at floor level, feed to mixing equipment below.



G FEEDING • MIXING • SIFTING • WEIGHING • PACKING
EQUIPMENT FOR THE PROCESS INDUSTRIES

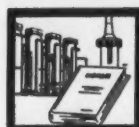
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JUNE 1958



processing and engineering data

230

Water film coefficients of heat transfer

M. J. CRAMER, Azusa, Calif.

and

D. S. DAVIS

Head, Dept. of Pulp and Paper Technology
University of Alabama

For film coefficients of heat transfer for water at moderate temperatures and pressures in turbulent flow inside tubes, McAdams' recommends

$$h = \frac{150(1 + 0.01t)V^{0.8}}{D^{0.2}}$$

where h = water film coefficient of heat transfer, Btu/(hr) (sq ft) (°F)

t = bulk temperature of the water, °F

V = velocity of the water, ft/sec

D = actual inner diam of tube, inch

To use the nomograph to solve this equation, follow the key.

of water with bulk temperature of 80°F, traveling with linear velocity of 8 ft/sec in tube with inner diameter of 1 inch?

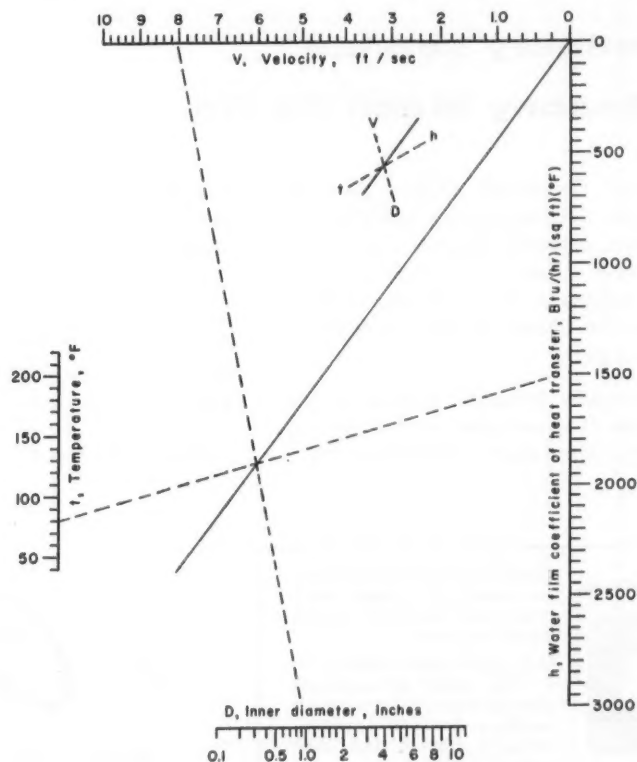
Connect 8 on the V scale with 1 on the D scale. Note intersection on slant line. Connect 80 on t scale with this intersection. Extrapolation of this line to h scale gives a film coefficient of heat transfer as 1490 Btu/(hr) (sq ft) (°F).

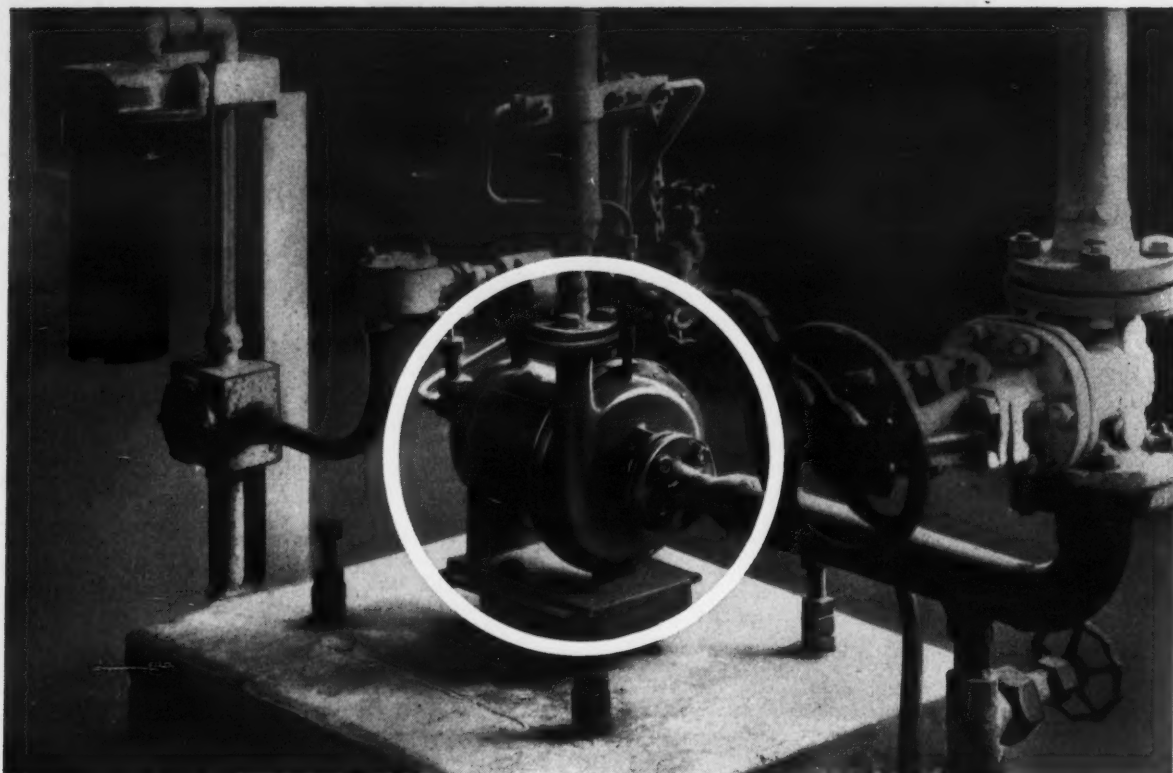
LITERATURE CITED

- 1) McADAMS, W. H., "Heat Transmission," p 228, 3rd ed, McGraw-Hill Book Co., New York, 1954

Typical Example

What is the film coefficient of heat transfer





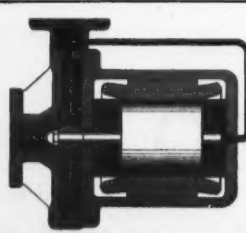
Chempump prevents H₂S leakage in refinery service at Socony Mobil Oil Co.

This explosion-proof *Chempump* handles an H₂S water solution in a DEA scrubbing operation at Socony Mobil Oil Company's Trenton, Mich. refinery. It was installed a year ago to replace a conventional centrifugal pump. In a full year of zero-leakage operation, the *Chempump* has required no maintenance of any kind.

Chempump is absolutely leakproof because it is a totally enclosed unit. It has no seals, no stuffing box, no packing. External lubrication is never required—

bearings are constantly lubricated by the pumped fluid itself. Maintenance is limited to an occasional inspection and replacement of bearings.

These and other *Chempump* advantages could well provide the answer to a pumping problem in your own plant. For details concerning your specific application, write to Chempump Corporation, 1300 East Mermaid Lane, Philadelphia 18, Pa. Engineering representatives in over 30 principal cities in the United States and Canada.



Chempump combines pump and motor in a single, leak-proof unit. No shaft sealing device required.

U.L. approved. Available in a wide choice of materials and head-capacity ranges for handling fluids at temperatures to 1000 F. and pressures to 5000 psi.

Chempump

First in the field...process proved

Check 5598 opposite last page

NEW SOLUTIONS

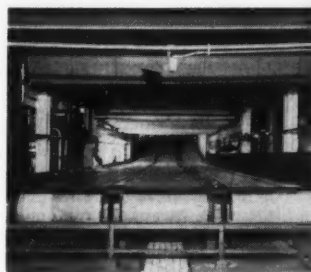
From page 104

chine. This includes machine's size press, fifth dryer section, and two 8-roll calender stacks — the critical broke section for final paper-making operation.

Broke from paper-making operation consists mainly of paper resulting from re-threading reels.

Conveyor is 15 ft wide and composed of three lines of 48-in continuous belts. Top portion of belts, feeding paper into pulper, rides over steel slider plate with 6-in high, 45° flared sides. Lower return portion rides over series of ball-bearing idler rollers. Final 61 ft inclines from 3- to 10-ft elevation. Powered by two-speed motor, unit is capable of 250 or 500 fpm.

Photo-electric system beneath paper-making machine and over conveyor activates conveyor. When electric eye



Head-on view of 3-belted, 101-ft conveyor. Photo-electric cell (arrow) activates conveyor when broke falls from paper-making machine (above) onto conveyor

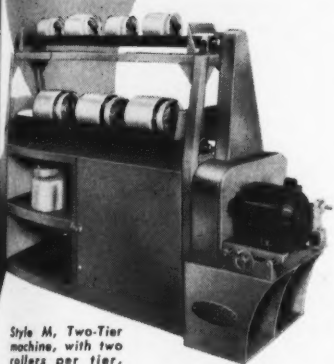
beam is interrupted by broke falling onto belts, conveyor starts. Shower valve above repulping tank opens to degree set on control panel to assure 4% consistency in dilution of incoming sheets. When beam is restored, conveyor stops and shower valve shuts off. Conveyor can also be manually operated.

Results: Conveyor has eliminated need for manual and batch handling on broke recovery system. "Pile-ups" resulting from former handling methods have also been stopped.

(Conveyor was engineered and manufactured by Gifford-Wood Co., Hudson, N.Y.)

Check 5599 opposite last page.

**MULTIPLE BATCH
GRINDING
WITH VERSATILE
abbé
JAR ROLLING
MACHINES**



Style M, Two-Tier machine, with two rollers per tier, mounted on built-in storage cabinet.

Multiple batches of similar or different materials can be economically ground, pulverized or mixed simultaneously on a versatile Abbé Jar Rolling Machine.

Jars, bottles or containers of different sizes can be used at one time. Each jar can be removed after its full grinding or mixing cycle has been completed—without stopping the machine.

Modern, rugged Abbé Jar Rolling Machines are available to handle single or parallel rows of jars, and in double or triple tiers for processing as many jars as required. Standard porcelain or steel jars range in size from 1 quart to 6 gallons. Built-in storage cabinets on tiered machines are optional.

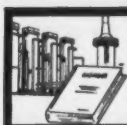
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Abbé Jar Rolling
Machine Catalog 79

Address Dept. 46

abbé ENGINEERING CO.
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New York 7, N. Y.

Designers and Manufacturers of
Ball, Pebble and Jar Mills • Pulverizers
Sifters • Cutters • Mixers

CUT HERE AND FILE



processing and engineering data

231

Stresses in slings

PAUL C. ZIEMKE

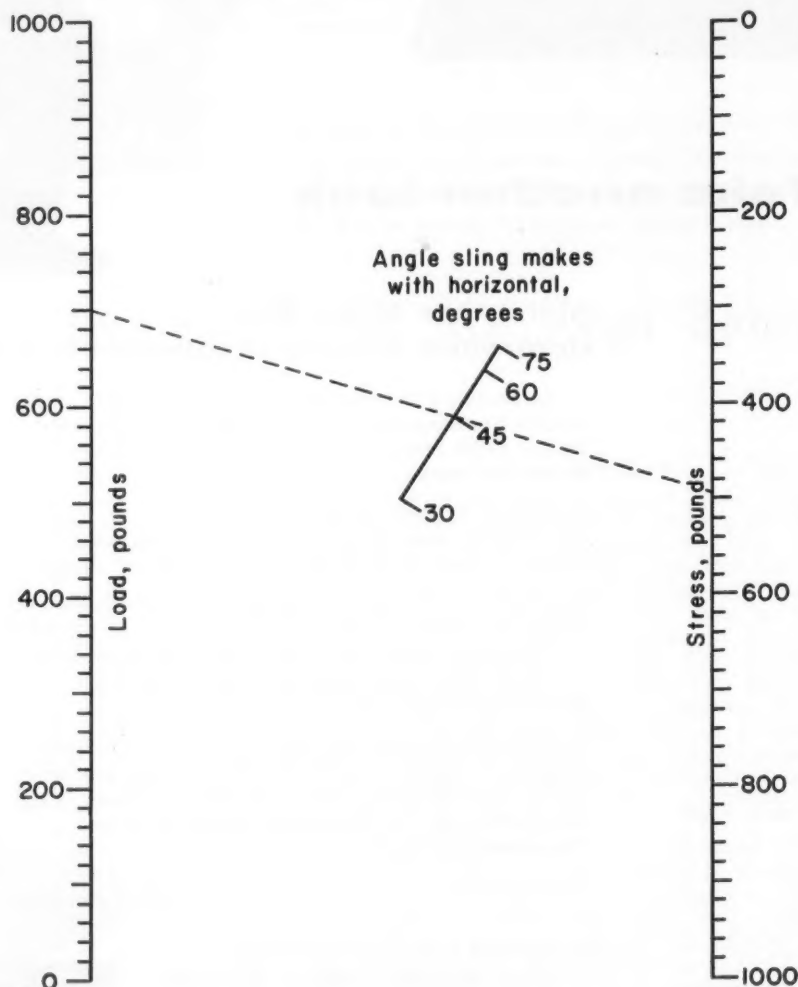
Clinton, Tenn.

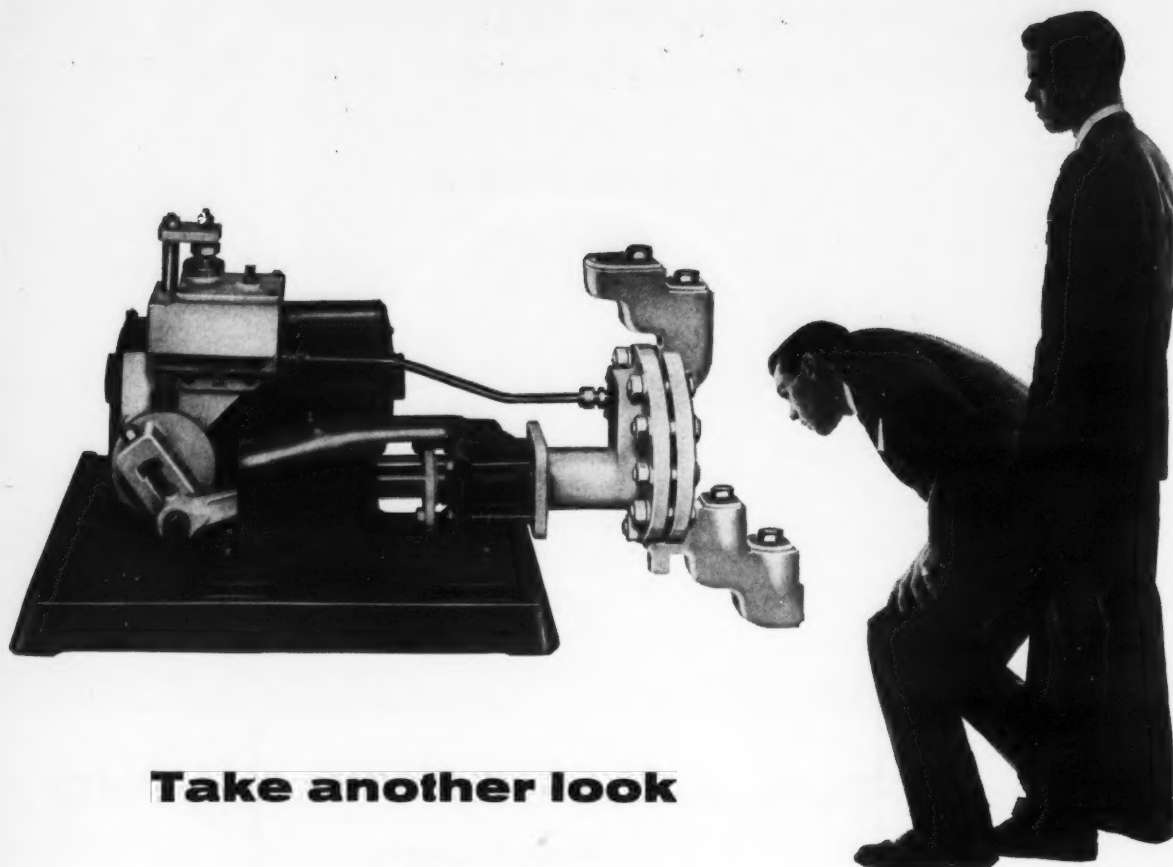
When slings are used for handling loads, overloading frequently occurs. All too many hitchers, riggers, and handlers are unfamiliar with additional stresses imposed on slings through angles developed. Accompanying nomograph covers four conventional angles encountered and loads that are imposed.

Two stresses are evident in the average sling pitch: tension and compression stresses — that

is, the "push" and the "pull." Simple principles of graphical statics are incorporated in this nomograph, which gives the pull in a sling when at a given angle.

Index line shows that when sling makes an angle of 45° with horizontal, 700-lb load results in stress of 495 lb in one side of a two-cable sling.





Take another look

At the New Milton Roy Controlled Volume Diaphragm Pump*

... For chemical metering applications requiring leakproof pump construction. Available as complete new units or in kit form to convert existing packed-plunger Milton Roy pumps.

Air binding in these diaphragm pumps is eliminated by positive mechanical action, once each stroke, to bleed air or vapor from the hydraulic fluid.

Step-Valve or column valve designs are available for pressures to 1000 psi and capacities from 1.1 to 138 GPH ... manual or automatic 0-100% capacity adjustment ... liquid ends interchangeable with Milton Roy packed-plunger pumps.

Take the Milton Roy approach to your metering and pumping problems ... write for detailed information to Milton Roy Company, 1300 East Mermaid Lane, Philadelphia 18, Pa. Engineering representatives throughout the world.

*Patent applied for.

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • Anders Air and Gas Dryers



Check 5601 opposite last page

NEW SOLUTIONS

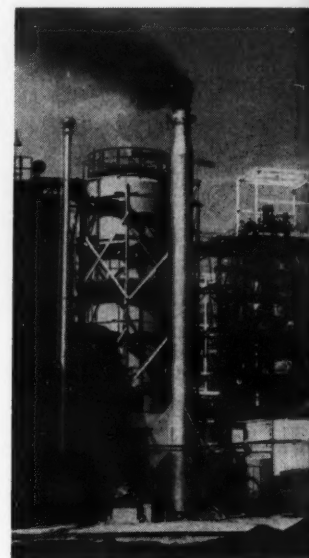
Silicone-organic coating protects smoke stack from corrosive fumes

Improved color and gloss retention, thermal stability

After three years of exposure to highly corrosive fumes, a smoke stack at a chemical plant has shown no sign of flaking, corrosion, or weathering. The stack is coated with an aluminum paint based on an experimental silicone-organic blend.

Coating is based on a silicone resin designed for cold-blending with alkyd, melamine, and acrylic-type baking enamels to give them improved color and gloss retention, thermal stability, and resistance to weathering.

Since the silicone resin is



Silicone-organic coating on smoke stack resists corrosive fumes

effective at concentrations as low as 10-20%, resultant lower cost should extend use of aluminum coatings into many fields which up to now have been largely unexplored because of high cost of straight silicone vehicles.

(R-64 silicone was developed by Silicones Div., Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.)

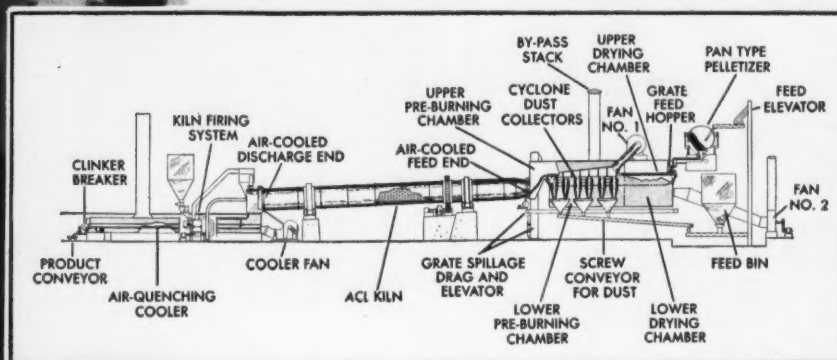
Check 5602 opposite last page.



IDEAS: from other industries and nuclear field
— new trends in research, processes, services

Revolving pans, 15' in diameter, are used to convert the finely ground raw mix into $\frac{1}{4}$ to $\frac{3}{4}$ " pellets

Main parts of ACL system. Overall space requirements are only little more than half that of conventional plants



One of the first in the US to install a full-size traveling-grate cement process, Diamond Cement finds that its biggest bonus, in addition to producing a top-quality product at savings in fuel and space, is that . . .

Dust Losses in Cement Plant Are Kept Below 1%

AN almost dust-free cement plant — having dust losses of less than one percent per weight of feed, compared to an average of 10 to 15 percent for conventional dry-process cement plants — is turning out 3500 barrels of cement per day in a suburban area about 8 miles northeast of Canton, Ohio. One of the first of its kind in the US, plant uses the ACL (Allis-Chalmers Lelupp) traveling-grate process. The \$5-million installation is owned by the Diamond Portland Cement Co., Middle Branch, Ohio.

In operation since last October, it boosts company's rated capacity to 2.5-million barrels of cement per year. Process has increased production at Middle Branch 70 percent. Only one 12½'-diam by 160'-long rotary kiln is used in the system. It replaces three 10'-diam by 150'-

long conventional dry-process kilns used until now.

Although in considerable use in Europe and other parts of the world, the ACL system has only recently obtained a foothold in this country. Much of the preliminary work for adapting the process in the US has been done by Allis-Chalmers in their pilot plant in Carrollville, Wisconsin (see *CHEMICAL PROCESSING*, August 1956, pages 64-66).

Besides having low dust losses, system has two other outstanding advantages — low fuel consumption and small space requirements. The pilot plant at Carrollville has shown that fuel savings amount to over 40 percent of that used in conventional plants. Space reduction can be reduced by as much as 40 percent.

Diamond Cement's installation consists essentially of three parts:

1) a pelletizing operation, 2) traveling grate for drying and partially burning pellets, and 3) rotary kiln for final burning.

Raw mix is pelletized in 15'-diam tilted revolving pans by addition of small sprays of water. Pelletizing prevents segregation of the finely ground raw materials during the process, minimizes "flushing" in the kiln, and insures uniform burning conditions. Pellets range in size from $\frac{1}{4}$ to $\frac{3}{4}$ ". Resultant end product is uniform in composition, of constant chemical analysis.

Leaving the pelletizing pans, the pellets are sent to the 12½'-wide by 72'-long traveling grate. This is divided into two sections — drying and preburning chambers — by a refractory wall. Pellets first enter the 26'-long drying chamber, where they are exposed to a downdraft flow of

500-600°F gases. The gases dry the pellets and are exhausted to the atmosphere at 200-250°F.

Pellets then enter the 43'-long preburning chamber. Here they are exposed to a downdraft of hot kiln exit gases at 1700-1800°F. Pellets become 20 to 35 percent calcined, heat-hardened, ready for entry into kiln. Exit gases from preburning chamber are drawn through cyclone dust collectors and returned to initial drying chamber of grate.

Key to Process

It is this double pass of gases that results in the low dust loss and contributes to the great fuel economy. Only after passing through the bed of pellets the second time and giving up most of the heat to the product are the gases exhausted to atmosphere.

Final calcining and burning

View of the Dumper at
Burlington, Indiana, Plant of
Universal Atlas Cement Company



THE NEW H & P ROTARY CAR DUMPER

unloads Bulk Materials as fast as you can deliver cars

- Dumper is designed to rotate, dump and return to initial position in just one minute.
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- Optional platen-mounted electronic scale is simple, accurate and economical.
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IT PAYS TO WEIGH AS YOU UNLOAD your bulk materials.

The new H & P Rotary Car Dumper, equipped with electronic scale platen (Patent Pending), unloads and weighs in one operation without requiring additional personnel or separate facilities.

Integral load cells permit instant weighing and light-weighing of car in compliance with National Bureau of Standards acceptance tolerance, and printing of weigh-tickets.

Exceptional accuracy and trouble-free performance are assured due to absence of wearing parts—no levers, fulcrums, etc.

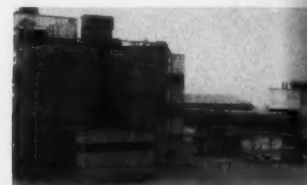
For the most economical car weighing and dumping operation, investigate the new H & P Rotary Car Dumper!

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IDEAS

of cement clinker is conducted in a coal-burning, 12½'-diam by 160'-long, two-support, rotary kiln. Additional thermal efficiency is obtained by recovering sensible heat from the completely burned clinker (still in pellet form). This is



General view of cement plant at Middle Branch, Ohio. Building behind raw mix silos (left) houses feed and pelletizing equipment as well as traveling grate. Pellets pass through kiln to the right and are discharged into cooler located beneath burner floor in enclosure at right

done in an oscillating cooler. Air blown through cooler is heated by clinker before it is used as secondary combustion air in kiln.

Clinker discharged from cooler is ready for immediate grinding. It does not necessarily have to be stored to cool. Ground product is packed in same manner as in conventional cement plants.

(Further information about ACL cement process may be obtained from Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.)

Check 5604 opposite last page.

Deuterated compounds

Eighty-one deuterium-labeled compounds are listed in four-page catalog which includes following categories: acid, alcohols, halides, and hydrocarbons. Many possess isotopic purities of better than 99 atom percent. Deuterated compound cat — Volk Radiochemical Company, 5412 North Clark St., Chicago 40, Ill.

Check 5605 opposite last page.

For more information on product at right, specify 5606 . . . see information request blank opposite last page. ➤

Check 5603 opposite last page



your Aloyco
sales engineer
has only
one business...

stainless steel valves

Your Aloyco sales engineer is a specialist... he handles only one line. You, as an Aloyco customer, deal directly with a man who knows his product and its application. He is equipped to get close to your problems and you'll find that this closeness to our customers goes right back to the Aloyco Plants. Doesn't it make sense to depend on the man and the company that specialize in corrosion resistant valves exclusively?

ALOYCO 503 Globe Valve... retained bonnet gasket... bolted bonnet... OS&Y... renewable Teflon disc fully retained. The Aloyco Valve line includes a wide range of alloys, types, sizes, and pressures of 150 lb, 300 lb, 600 lb and above. Nuclear Valves up to 2,500 lb.

ALLOY STEEL PRODUCTS COMPANY
Linden, New Jersey



The Arithmetic of Materials Handling



Fuller Airveyor unloads wood flour to two forty-five foot silos. Second Airveyor system reclaims material 360 feet to processing.

General Electric Changes From Bags to Airveyor ... Cuts Handling Costs 60%

As part of a program to increase plastics production and reduce operating costs at its Pittsfield, Mass. plant, General Electric Company called in Fuller engineers to design systems for handling wood flour in bulk.

Wood flour—used as a filler in phenolic molding compounds—was being handled in 75 and 100-pound bags. Unloading one carload of bags required 16 manhours. Bags were loaded on dollies and wheeled to a distant elevator.

SAFETY FIRST—The two pneumatic Airveyor® materials handling systems, engineered and manufactured by Fuller Company, were installed by its parent company, General American Transportation Corp., providing undivided responsibility. This installation resulted in a 60% saving in handling costs! The two systems

are handled by one full-time and one part-time operator. Manhours to unload one car have been reduced from sixteen to six!

In addition, all equipment is designed to conform to strict safety specifications set down by G-E engineers.

FLOW YOUR MATERIALS—The Airveyor is a system that flows your material through sealed pipes. It's fast, safe, and self-contained. The pipes can be placed close to ceilings, run underground or through walls.

Whether you process wood flour—or other dry granular materials—look into the many economies of Airveyor conveying. Write today for interesting, detailed literature on Airveyor and other Fuller pneumatic materials handling systems.



G-198
1304



FULLER COMPANY
136 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
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"See Chemical Engineering Catalog for details and specifications".

Check 5607 opposite last page

Bond-resistance test on bi-metal tube announced

Information that will assist designers of heat exchange equipment is the announcement by Wolverine Tube, Division of Calumet & Hecla, Inc., of a test for precise measurement of the bond resistance of bare and finned tubes. Tests have shown that the resistance to heat flow of the bond between bi-metal tubes is negligible on production runs of manufacturer's Type L/C tube.

Beta-propiolactone gas found to be effective germ killer

Fully sterilizes enclosed spaces in two hours

A new germ-killing gas, beta-propiolactone, has been discovered by the US Army Chemical Corps. Until recently, the compound has been used only in a liquid solution. Work on the gas has been done at the Corp's laboratory at Fort Detrick, Frederick, Md., where the agent has been used effectively to disinfect entire laboratory buildings. Possible future uses are seen in sterilizing operating rooms in hospitals, nurseries, etc.

Beta-propiolactone has a relatively high boiling point (155°C), hence low vapor pressure at ordinary temperatures. It is active at quite low concentrations, and it is easy to obtain bactericidal concentrations of its vapor in air.

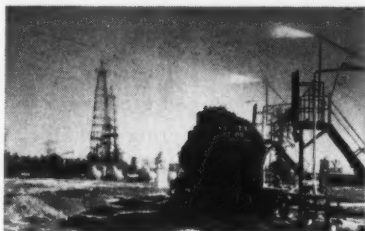
The gas is not as hazardous to handle as ethylene oxide, but it is not as efficient in penetrating porous materials. It acts as effectively as formaldehyde vapor, but works more rapidly with fewer adverse side effects. Like formaldehyde, the gas requires a high relative humidity, 70% or above, to be rapidly effective. It sterilizes enclosed spaces in about two hours rather than the 10 or more required with formaldehyde.

Like formaldehyde, the material can be put in large en-

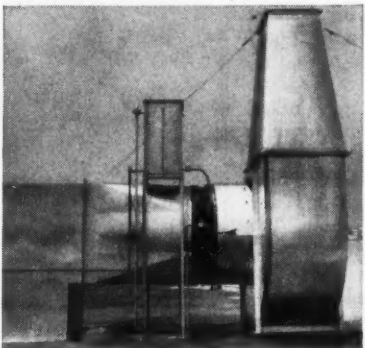
They used guns to kill odors

some interesting examples of Airkem installations

Spray guns are frequently used to vaporize Airkem odor control products for industrial application. Airkem has developed special formulas that are individually matched to the hundreds of different odor problems in industry. Here are some of the unusual examples of odor problems treated by the Airkem odor specialists.



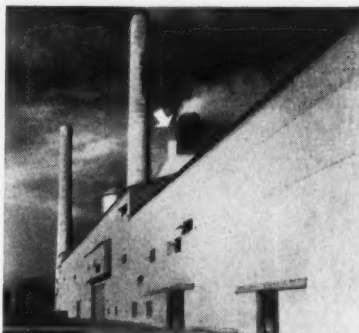
Mercaptans, highly odorous products, are mixed in natural and manufactured gases by utility companies as a warning agent against leakage. In concentrated form they are almost unbelievably foul. A spray gun installed above the tank car vaporizes an Airkem odor control product at the loading station of a mercaptans manufacturer. Utility companies use the same product to control odors from leakage or spillage of mercaptans in their plants.



Sludge Drying has enabled many communities to convert sewage into an asset. Many plants have even made profits selling the dried sludge for fertilizer. However, the odor from the operation is not pleasant. To eliminate the odor problem in this installation, an Airkem spray unit was placed directly in the steel ducting that discharged the odorous air into the atmosphere. Equipment and controls are simple, easy to install and service.



Chemical Plants, such as this midwest ammonium sulphate installation, often create odors that disturb their neighbors. Management tried several techniques before learning about Airkem's effective and economical method. A plant employee is shown adjusting the spray gun for proper odor control.



Cement Plants have odor problems, too. Here is a New York State plant of a major cement company that uses an Airkem installation with excellent results. The odors, which smelled very much like hydrogen sulphide, caused a serious community relations problem when the wind carried them into the residential areas. The Airkem guns, installed at the top of the stack, quickly brought the odors under control.



Food Processing odors, like those released by this spaghetti sauce plant, are obnoxious to many communities. Nor-

mally zoning restrictions would have prevented this plant from operating in its present location. However, a small compressor-powered Airkem system solved the problem to the complete satisfaction of the neighborhood. Fish processors and many other food plants have also learned to rely on Airkem for effective odor control.



Odor Control Tests are continuous at Airkem's laboratory, the largest in the world devoted solely to odor studies. Here an Airkem engineer checks operation of a spray unit in the test room. Many types of evaporation equipment are used besides spray guns. There are hundreds of different formulas used by Airkem for their odor control work. Each odor is treated as a special problem, thus assuring a maximum effectiveness with minimum possible cost.

If you have an odor problem, describe it in the coupon below. We may be able to assist you in eliminating the problem. Write for information today.



Specialists in Odor Control

AIRKEM, INC. CP-68
241 East 44th Street, New York 17, N. Y.

Please send me information on industrial odor control.

My Problem is _____

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Company _____

Address _____

City _____ Zone _____ State _____

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Permanently End Condensation Drip, Rust and Corrosion with NoDrip Plastic Coating!

Here is the inexpensive, easy way to solve your condensation problem once and for all. NoDrip plastic coating acts immediately to insulate and protect tanks, pipes, walls, ceilings, air ducts and other metal equipment against condensation drip, rust and corrosion. NoDrip can be applied by anyone without special experience with brush, trowel or spray. NoDrip is also resistant to acid, alkali and brine... protects concrete, brick, plaster, tile, wood or composition surfaces.



**32-PAGE
NoDrip DATA
HANDBOOK**

Complete with photographs, charts and technical information to help solve your condensation problem. Write today!

Available at leading plumbing and mill supply houses
J. W. MORTELL COMPANY, 830 Burch St., Kankakee, Ill.

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NO Dura-Buket* has ever worn out

*Special Plastic
by Fiberite Corp.



**AFTER ONE
YEAR ON THE
SAME JOB**

Proved and IMPROVED: Yes, four years of continued research and testing under actual severe conditions, have proved that the revolutionary improved Dura-Buket outwears, outlasts ordinary elevator buckets many, many times. Dura-Buket is better than ever because it's made of a special strong and shock resistant plastic developed by the Fiberite Corporation. Order your supply today.

And Dura-Buket gives you these important trouble and money-saving extras.

1. Special impact-resistant plastic by Fiberite.
2. Strong and shatter-proof.
3. High speed and light weight.
4. Spark and static-proof for safety.
5. Self-cleaning for high sanitation.
6. Can't corrode.

FOR COMPLETE INFORMATION AND PRICES WRITE TO

**Dura-Buket DIVISION
NATIONAL OATS COMPANY
EAST ST. LOUIS, ILLINOIS**

Check 5610 opposite last page

IDEAS

closed spaces which need not be hermetically sealed. Its vapors are lachrymatory, but less irritating than those of formaldehyde. It does not polymerize on surfaces, thereby greatly simplifying the removal problem.

(Based on paper presented at Seton Hall College of Medicine and Dentistry, Jersey City, N. J.,) by Dr. C. R. Phillips, Chief Physical Defense Division, US Army Chemical Corps, Fort Detrick, Frederick, Md.)

Continuous pulp system uses minimum caustic, yields top-quality pulp

Wood chips are processed cold, in few minutes

A continuous, cold pulping system has been developed wherein wood chips are processed in only a matter of minutes. Uniform, high-grade pulp is reported to be produced using less caustic for a specific quality of pulp than previously possible with conventional batch processes.

Basically, system consists of two stages. Chips are reduced in size and impregnated with partially spent (recycled from second stage) caustic in a press operating at 1000-2000 psi.

The partially impregnated particles are then mixed with fresh make-up caustic and sent to second press for final impregnation, fiberizing, and removal of spent liquor. The fiberized product is ready for refiners.

System lends itself to various species of wood, including many hardwoods. Digestion is easily controlled and maximum strength pulps are produced with minimum caustic consumption.

(Continuous, cold caustic pulping process was jointly developed by The V. D. Anderson Co., Division of International Basic Economy Corporation, 1935 W. 96 St., Cleveland 2, Ohio; and Sprout, Waldron & Company, Inc., 130 Logan Street, Muncy, Pennsylvania.)

GET THIS FREE GROUTING GUIDE

... before you Grout
another piece of
heavy equipment



Send for this free grouting guide which clearly illustrates 11 common machinery settings, methods of grouting and forming, and hot and cold weather grouting. Discussion covers proper mixing and placing of grout, reasons for using prepared, non-shrink grout, etc.



DIVISION OF AMERICAN-MARIETTA COMPANY

the MASTER BUILDERS CO.

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Check 5611 opposite last page

MOVE MATERIALS THRU BINS HOPPERS CHUTES

with "maintenance-free" Navco One-Piece Vibrators*

Navco Air Vibrators have a patented one-piece design for trouble-free operation. No need to stock spare parts—no assembly bolts, housing springs, separate striking plates, or grooved pistons in Navco Vibrators. Complete line for bins, hoppers, chutes, R. R. Cars, concrete forms, and batching. Now being specified by the country's leading automotive production foundries.

NAVCO NATIONAL AIR VIBRATOR CO.
2366 W. 7th St. • Cleveland 13, Ohio

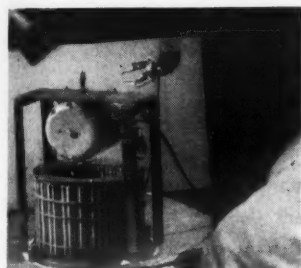
Check 5612 opposite last page

CHEMICAL PROCESSING

Study at Dow Corning tests radiation effects on electrical insulation

Investigations into the radiation effects on complete electrical insulating systems were kicked-off recently when a silicone-insulated motor was deliberately exposed to a radioactive source. Anticipating an increased interest in atomic power plant construction in the near future, Dow Corning Corporation is conducting the tests to obtain information regarding the reliability of equipment — from transformers to terminal boards — subjected to continuous radiation.

The motor under test is a standard 1-hp, 182-frame, 1800-rpm, 3-phase, 440-volt, squirrel cage machine. It is absorbing gamma ray energy at rate of 0.1 megarad per



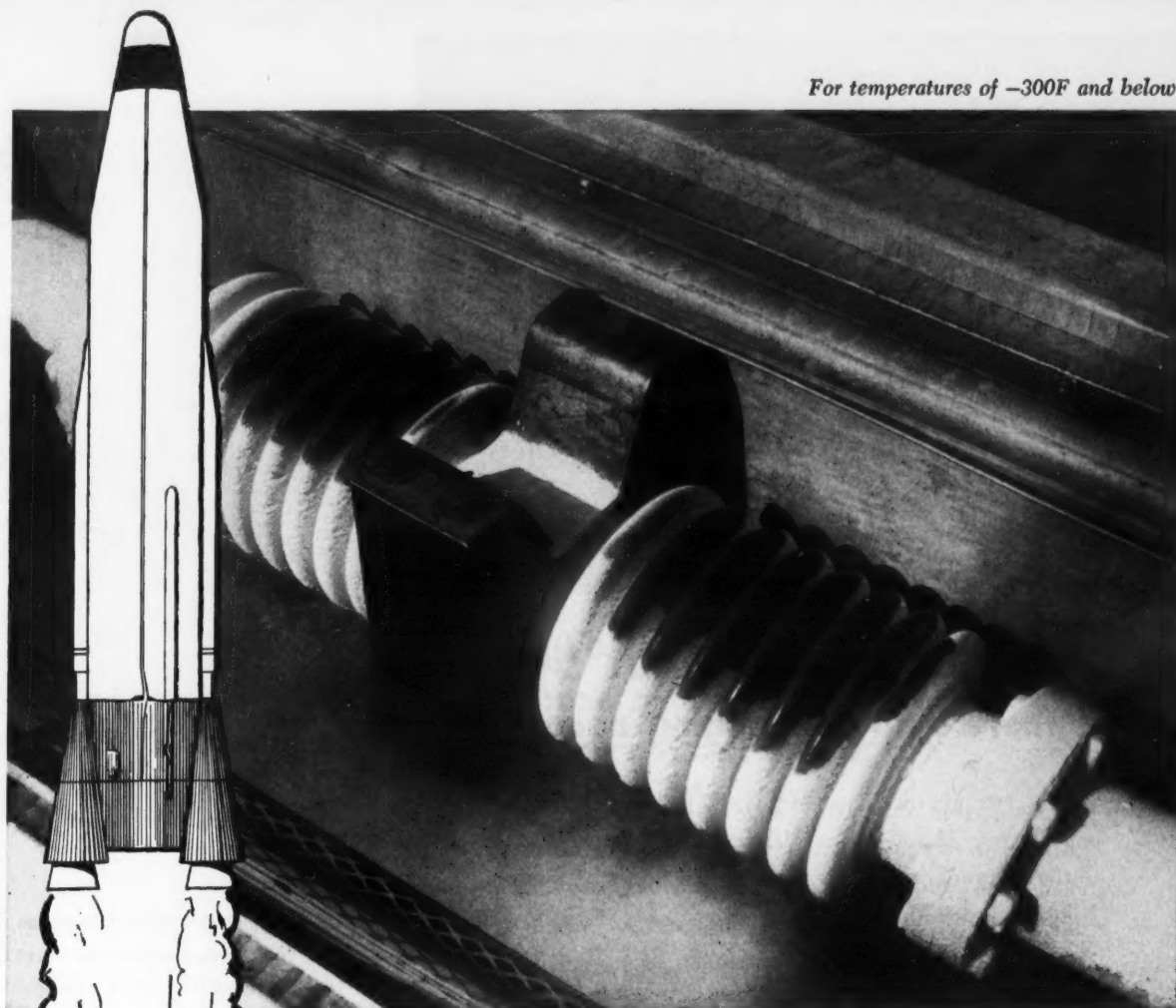
Motor mounted directly over radioactive source is absorbing gamma ray energy at rate of 0.1 megarad per hour. Engineers predict motor will run for at least 10 years

hour. To further simulate actual on-the-job service, the motor is being reversed every three seconds or so to maintain an operating temperature of 200°C.

Additional tests are planned for a variety of silicone-insulated motorettes, capacitors, wire, cable, and electronic assemblies, many of which will be oven-aged at 200°C at the same time they're being exposed to the radiation source.

Engineers estimate that the motor may run at least ten years.

(Radiation exposure studies are being conducted at Dow Corning Corporation, Midland, Michigan.)



For temperatures of -300F and below!

Sola-Flex® joints provide safe, easy handling of liquid missile fuels

LIQUID OXYGEN, used in Convair's *Atlas* ICBM, requires the very best handling know-how—and equipment. These rugged Sola-Flex expansion joints are in use on Convair's fuel test facility at San Diego, California. Made from 321 stainless, the 6 in. double-end anchor-base unit handles over 5 in. of axial movement in a LOX test line.

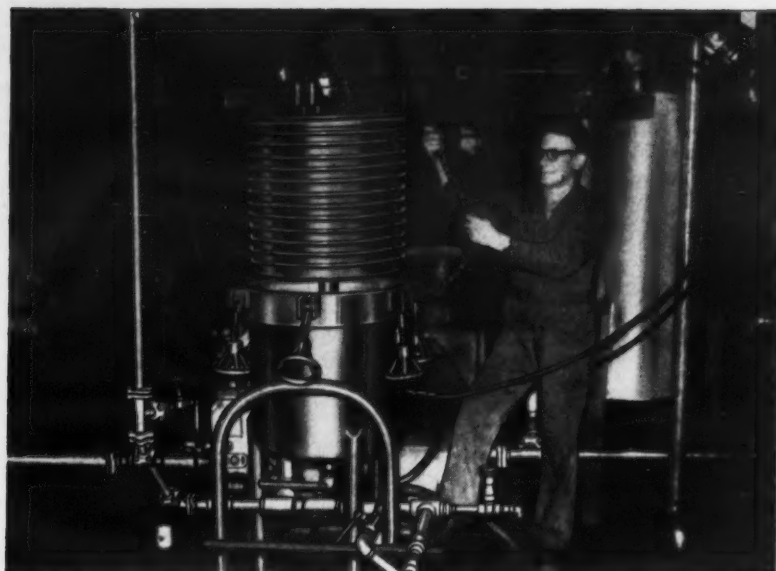
Solar manufactures the most comprehensive line of bellows and expansion joints in the world. They are made from a wide variety of stainless and high alloys for important nuclear, missile and industrial applications—in sizes ranging from ½ in.

to 35 ft in diameter. They are built for service from -320F to 1200F. And they tame "hard-to-handle" pressures up to 3500 psi for special applications.

A new pamphlet describes Solar's complete line of expansion joints. Write for it to Dept. F-21, Solar Aircraft Company, San Diego 12, California.



Check 5613 opposite last page



Filter downtime cut 50% and there's no scavenging necessary

THAT'S THE REPORT from Mr. G. E. Bradley, Jr., Assistant Factory Manager for Vanderbilt Chemical Co. at Bethel, Connecticut, on his experience with a new Niagara Batch-Miser® filter.

After cleaning, this Niagara Filter is *back on stream in minutes*. That's because disassembly, cleaning, and reassembly are made far easier by Niagara's advanced design which eliminates tie rods.

There's *no separate scavenging operation* with this Niagara Filter either. Downtime is reduced, and there is no liquid heel left at the end of the filtration cycle.

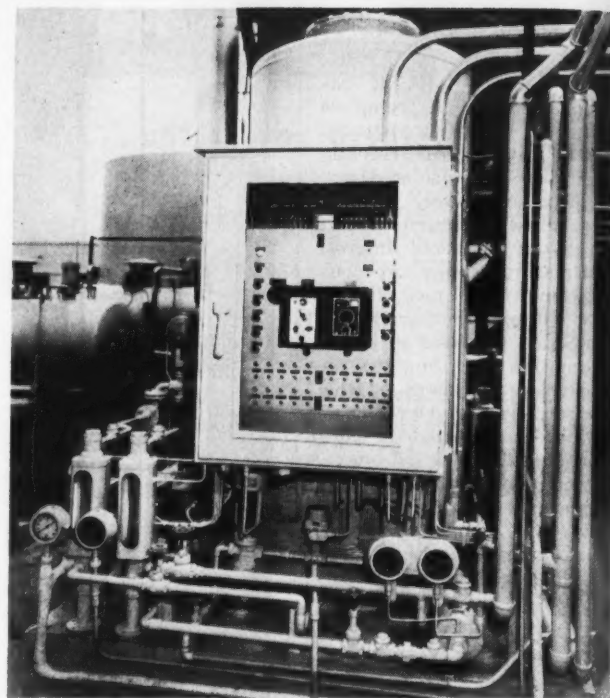
With Niagara Filters you can realize similar savings in your plant. First step — consult the Chemical Engineering Catalog for facts on Niagara Filters, or write us today, outlining your requirements.

Niagara® FILTERS
A DIVISION OF
American Machine and Metals, Inc.

Dept. CPN-658, EAST MOLINE, ILLINOIS
(Niagara Filters Europe: Kwakelpad 28, Alkmaar, Holland)
SPECIALISTS IN LIQUID-SOLIDS SEPARATION

Check 5614 opposite last page

IDEAS



Completely automatic operation of many valves on package demineralizer saves makeup water and chemicals, and cuts manpower needs. Unit keeps turbines in excellent condition as it —

consistently furnishes water with 0.001 ppm silica content

GORDON WEYERMULLER

Associate Editor

With **ALBERT E. HENDERSON JR.**

Results Engineer

Ninemile Point Steam Electric Station
Louisiana Power & Light Company
Westwego, Louisiana

standing features. However, one of the most advantageous units in use is the package automatic demineralizer.

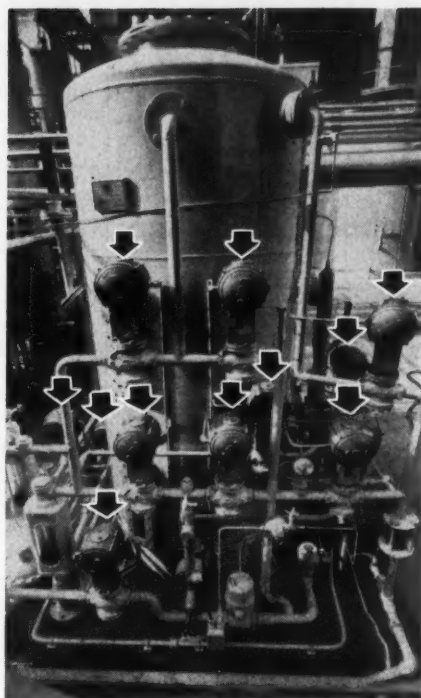
This demineralizer continually supplies water with a silica content of 0.001 ppm and below; considerably better than the 0.01 ppm guarantee. Total solids is less than 0.1 ppm, which is better than an evaporator would give. The pH runs about 6.8 to 7.0.

Another advantage of the compact, package demineralizer is the consistent and efficient regeneration maintained by automation. Once the master timer is set for the

Being one of the most modern and highly automated power plants in the country, with only five men per shift required to generate 325,000 kw of electricity, the Ninemile Point station of Louisiana Power & Light Co. near New Orleans has many out-

Once master timer is set for proper regeneration sequence, there is no deviation

Arrows indicate a number of the motor-operated valves which control operation of demineralizer



proper time sequence, there is no deviation from this sequence. Hence, chemicals and water are saved that otherwise would be wasted due to excess amounts added under manual operation.

With completely automatic operation of the demineralizer less of a man's time is required to operate the many valves that open and close during the regeneration period. Automatic operation prevents possible leakage of acid or caustic into plant cycle which might happen with manual operation of the valves.

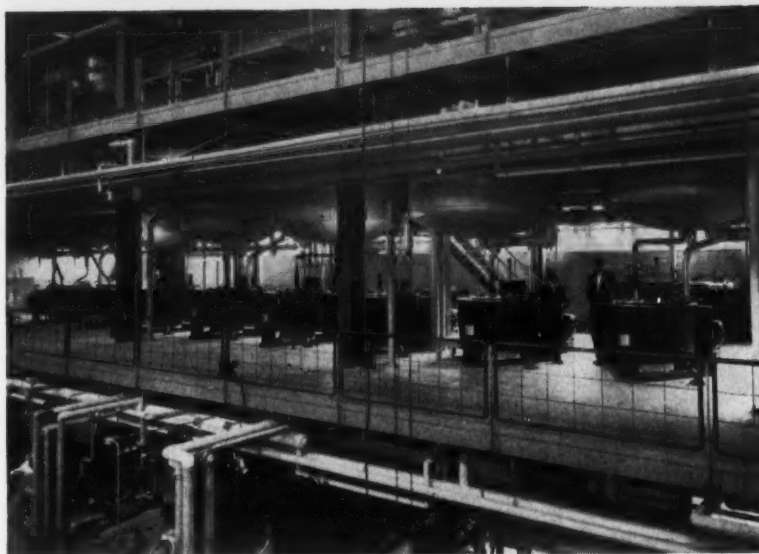
As a result of the high-purity water furnished by the package demineralizer and another similar unit not factory assembled, iron oxide deposits on tubes have been very low. Plant has not lost any boiler or superheater tubes. No. 1 boiler was removed from service in December 1956 and the turbine was completely dismantled for the first time in five years. No signs of deposits on any of the blading could be found. Tur-

bine was in excellent condition.

Package demineralizer uses raw water that is purchased from city with normal sanitation chlorination. Plant makeup water has averaged 9.5 gpm during past year. This includes all water added to system during startups after inspections and a number of weekend startups of No. 1 Unit. Demineralizer is rated 14,600 gpm at 380-mmho water influent, with effluent of 0.4 mmho. Effluent discharges through a back-pressure valve and through water meters to each condenser hot well. Effluent or makeup is put through the deaerating section of each condenser.

Control Valves

Package demineralizer employs a number of Hydromotor automatic valves which are operated by small electric motors. These valves have fail-safe operation and two-wire control. Direct-connected actuator and valve stem provides for smooth opening and



Labor savings will pay for these 6 new BATCH-MASTERS® in less than 2 years

Nutley, N. J. — In expanding its production facilities for Gantrisin, one of their sulfa group pharmaceuticals, Hoffmann-LaRoche, Inc., had the option of selecting nine 48" conventional centrifugals or six 48" Tolhurst Batch-Master® machines.

After considering that only one man is required to tend each two "Batch-Masters," while four men are needed for every three conventional units, the manufacturer decided on the former machines. The resulting 75% labor savings will offset the total cost of the new machines in approximately 18 months.

The "Batch-Master's" fast bottom discharge and hydraulic unloading make the difference in labor requirements and in batch processing cycle time.

.....
FOR MORE COMPLETE DATA, SEE
TOLHURST'S SECTION IN CHEMICAL
ENGINEERING CATALOG or write

Tolhurst CENTRIFUGALS

A DIVISION OF

American Machine and Metals, Inc.

Dept. CPT-658 EAST MOLINE, ILLINOIS

SPECIALISTS IN LIQUID-SOLIDS SEPARATION

Check 5615 opposite last page

CATHODIC ACTION FOUND TO BE THE MOST EFFECTIVE RUST PREVENTION*

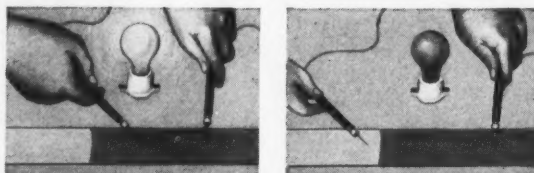
SEE PROOF Steelcote EPO-LUX No. 100 ZINC RICH ZINC DUST PRIMER



OVER 90%
ZINC METAL
COATING

* Cathodic protection is utilized by engineers where all other coatings and paints fail to stop rust... a reliable guide in your rust control decisions.

provides
electro-conductivity
for its cathodic protection



At left, above, glass plate is coated with Zinc Rich Z-D Primer. Current carried by zinc film through probes lights lamp; at right, no current flows when one of probes is placed on uncoated glass.

EPO-LUX No. 100 PROTECTS MACHINERY & METAL FROM

Provides the greatest chemical resistance of any air dry organic coating. Dries to 75% of hardness of glass, yet remains flexible to withstand cracking and chipping. For further information write or wire

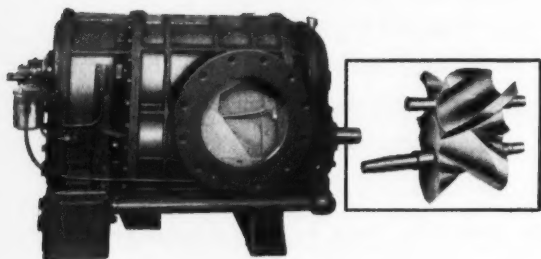
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MORE THAN 45 CHEMICALS-----



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Check 5616 opposite last page

AXI-COMPRESSORS



AIR, GAS OR VAPOR PROBLEMS?

If you are interested in compressor efficiency for handling air, gas or vapor, investigate the I-R AXI-COMPRESSOR line. With unique axial-flow cycloidal design, the rotors never touch... need no internal lubrication... deliver oil-free air. More air with less power consumption. Sizes range from 100 cfm to 15,000 cfm, for vacuums to 25 inches, pressures to 15 psi. Details in Bulletin 11,001.

Ingersoll-Rand

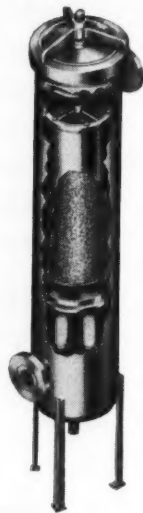
17-662

11 Broadway, New York 4, N. Y.

Over 1000 types and sizes of I-R compressors... 1/4 to 6000 hp,

Check 5617 opposite last page

The Problem of Oil Vapor ... and how to solve it!



Vape-Sorber is a registered trade name of Selas Corporation of America.

Chemical and pharmaceutical manufacturers, petroleum refiners, food processors and users of pneumatic instrumentation... all encounter critical procedures wherein hydrocarbon vapor in compressed air and process gas streams produces adverse results.

Typical Vape-Sorber uses include:

- Aeration and agitation of liquids
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The Selas Vape-Sorber, effectively combining principles of liquid-gas separation and high capacity oil adsorption, completely removes hydrocarbon vapors, dirt and liquid-phase entrainment of every kind. Its compact, welded steel construction contains no moving parts, requires minimum maintenance.

Send for your free copy of this new Vape-Sorber booklet No. 156. It describes, by chart and table, the exact size and model for your requirements.

SELAS CORPORATION OF AMERICA | DRESHER, PENNSYLVANIA

Check 5618 opposite last page

IDEAS

closing at high pressure drop.

Automatic valves consist primarily of two components, the actuator and the valve body. Actuator frame is a cast structure supporting the power unit, which operates cylinder and return spring. Hydraulic pump which supplies the fluid pressure to actuating cylinder is driven by a direct drive electric motor. After completion of valve stem travel, an integral switch cuts off pump motor. Slight electrical energy required to hold electromagnetic relief valve closed maintains actuator in its "on" position. Power failure or electrical interruption causes relief valve to open and spring-loaded piston returns valve actuator to "off" position.

Resins

Package demineralizer has used a mixed bed of IR-120 cation exchange resin and IRA-401 anion exchange resin during the three years it has been in service. IR-120 is a sulfonated polystyrene resin cross-linked with divinyl benzene. IRA-401 is a porous strongly basic quaternary ammonium-type anion exchange resin. Operations experience with both of these resins has been good. Resins have been replaced in demineralizer once since startup due to fouling with organic matter, iron, and chlorine. Plans have been made to eliminate these contaminants by aerating, filtering, and carbon treatment.

Maintenance

Mixed bed tank for package demineralizer is lined with Koroseal flexible polyvinyl chloride. Experience with this lining has been very good, with no evidence of failure in several years service. PVC lining was applied by company that designed and furnished the demineralizer. Lining made from another material in other tank has not been quite as satisfactory.

Some maintenance was necessary on acid injection system due to check valve failures in dilute acid handling

equipment. This problem was solved by using 316 stainless steel valves with Teflon seats.

(Package demineralizer was designed and furnished by Illinois Water Treatment Co., Rockford, Ill.)

Check 5619 opposite last page.

(Hydromotor control valves are product of General Controls Co., 801 Allen Ave., Glendale 1, Calif.)

Check 5620 opposite last page.

(IR-120 and IRA-401 exchange resins are product of Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.)

Check 5621 opposite last page.

(Koroseal flexible PVC lining is manufactured by B. F. Goodrich Industrial Products Co., Marietta, Ohio.)

Check 5622 opposite last page.

Ships' hulls, propellers kept from corroding by cathodic protection

May permit use of steel instead of bronze propellers

Longevity can be increased and repair costs cut on ships' hulls and propellers through use of a cathodic protection system which protects them against corrosion. Called Capac, system has already been installed on US Navy craft and some commercial ships.

Other applications include pipelines carrying sea water for cooling purposes to oil refineries, steam plants, Texas oil towers, radar towers, and tidal hydroelectric turbines.

The possible use of steel propellers may be a very important advantage of the system according to its developers. Stronger and more economical than standard bronze, steel propellers have heretofore been impractical because of their susceptibility to corrosion.

The impressed-current cathodic-protection device safeguards ships both at sea and at dockside. Platinum anodes mounted on the hull are key elements in the system. Cent-

To page 119

HERE ARE COMPANION PRODUCTS TO MAKE YOUR FIGHT AGAINST CORROSION...



*less costly-
more effective*

They are: Tygorust — a primer that locks protective coatings to damp or dry rusted steel; and Tygon "ATD"* Hot Spray vinyl which builds up a film thickness of 5 mils or better in just two passes of a spray gun.

Cost savings are big. First of all, surface preparation costs are reduced materially. Second, material costs are lessened because Tygon Hot Spray requires no thinners. Third, application costs are lowered because two spray passes give a film thickness equal to five coats of conventionally applied paints. Fourth, longer life means lower maintenance costs, less frequent recoating.

But cost savings are, in a sense, the least important part of the story. You get better protection, more complete protection, longer lasting protection from corrosive attack.

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THICKNESS
DENSITY**

Get the full story today. Write for your free copy of the TYGON painting manual. Address: Plastics & Synthetics Div. U. S. Stoneware, Akron 9, Ohio.

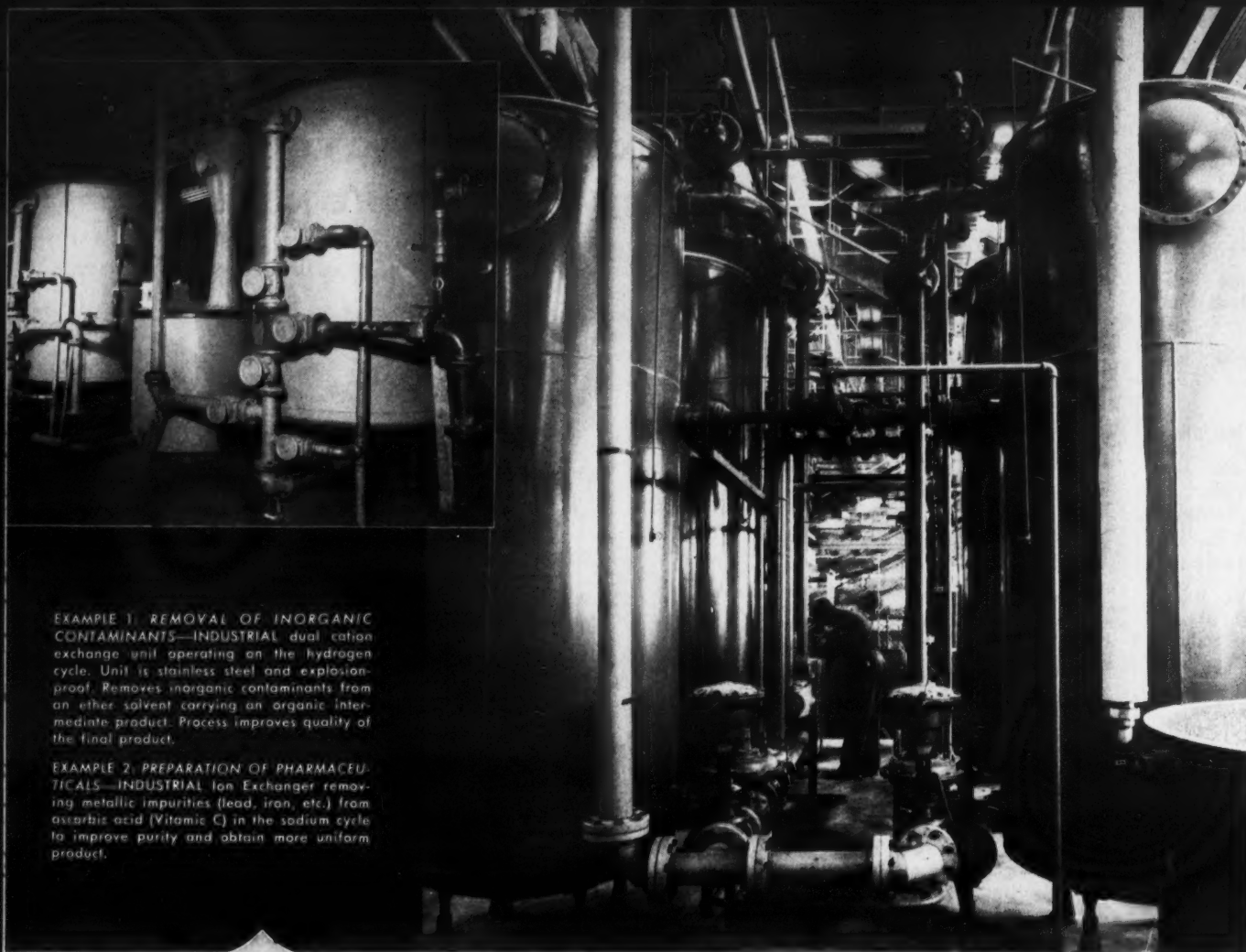
**PLASTICS AND
SYNTHETICS
DIVISION**

U. S. STONEWARE

AKRON 9, OHIO

New York • Chicago • Houston

Check 5623 opposite last page



EXAMPLE 1: REMOVAL OF INORGANIC CONTAMINANTS—INDUSTRIAL dual cation exchange unit operating on the hydrogen cycle. Unit is stainless steel and explosion-proof. Removes inorganic contaminants from an ether solvent carrying an organic intermediate product. Process improves quality of the final product.

EXAMPLE 2: PREPARATION OF PHARMACEUTICALS—INDUSTRIAL Ion Exchanger removing metallic impurities (lead, iron, etc.) from ascorbic acid (Vitamin C) in the sodium cycle to improve purity and obtain more uniform product.

INDUSTRIAL ION EXCHANGERS

meet highest purity standards
for continuous processes

Every day INDUSTRIAL Ion Exchangers are *replacing* expensive, complicated processing equipment in the purification of literally hundreds of chemical products. Why? Because INDUSTRIAL has successfully adapted the newest developments in ion exchange research to simple techniques. This new equipment provides advantages like these: **NO HOLD-UP TIME . . . LOWER CAPITAL INVESTMENT . . . LOWER OPERATING COSTS . . . PLUS—PURITY STANDARDS TO MEET VIRTUALLY ALL REQUIREMENTS!**

The operating simplicity of these new techniques permits immediate integration of an INDUSTRIAL Ion Exchanger in almost any continuous chemical process. The views on this page show some current specialized applications.

Investigate how INDUSTRIAL Ion Exchange equipment can solve your purifying problems at lower costs. Call or write today for details covering an analytical economics study.

INDUSTRIAL

C-258

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For more information on product at left, specify 5624 see information request blank opposite last page.



IDEAS

From page 117

tered in neoprene blankets cold-bonded at the hull, they "throw" electrical current over the ship. By making the entire hull cathodic, this current reverses the galvanic electrical flow between different parts of the hull which causes corrosion.

Since there are no "sacrificial" parts to be replaced, the system requires no service or maintenance and can be salvaged intact at any time, according to manufacturer. It can be installed on both old and new ships.

(Capac was developed by Charles Engelhard, Inc., 850 Passaic Ave., East Newark, New Jersey.)

Fresh air for vitamins — tubes of activated carbon remove odors in bottles

Activated carbon is helping pharmaceutical manufacturers solve a difficult odor problem inexpensively and with minimum amount of effort.

Ayerst Laboratories, Inc. of New York uses high-grade



Ayerst Laboratories uses four different size T-PACs to remove familiar vitamin odor and tastes from bottles of capsules and tablets

nut shell carbon in the bottling of vitamins it produces. Activated carbon adsorbs odors and tastes usually associated with vitamin capsules and tablets and eliminates excess moisture when needed.

The carbon is packaged in porous fabric tubes which are placed in bottles. This is accomplished easily and rapidly on the Ayerst production line.

Two different types of tubes are available: T-PAC for

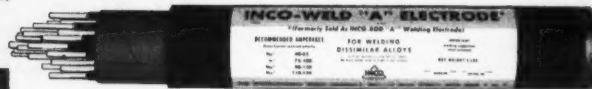
Now—two ways to weld dissimilar alloys ...and most problem joints



1. Inco-Weld "A" Wire for inert-gas metal arc welding . . .

Production weld dissimilar alloys with the new Inco-Weld "A"* Wire and the inert-gas metal arc process. Inco-Weld "A" Wire gives you all the advantages you get from the electrode with this important extra:

An Inco-Weld "A" Wire deposit can be age-hardened. This property is extremely important if you're welding super alloys that are to be age-hardened after fabrication.



2. Inco-Weld "A" Electrode for metal-arc welding . . .

Field weld dissimilar alloys and hard-to-get-at joints with Inco-Weld "A"* Electrode (with the green flux coating) and the metal-arc process. Along with its name change (formerly sold as Inco-Rod "A" electrode) you'll find it's been improved to give even greater hot ductility.

Either way — with wire or electrode — you get excellent operability in all positions . . . easy slag removal . . . spray-type arc . . . corrosion resistance in most cases equivalent to or better than either of the alloys being joined.

Get this new booklet —

"Now You Can Weld Dissimilar Alloys — Easily"

Illustrated with many case histories on problem welds solved with both electrode and wire . . . this booklet gives results on test data involving a wide variety of dissimilar alloys welded successfully. For your copy, write:

*Trademark of The International Nickel Company, Inc.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street



New York 5, N. Y.

INCO WELDING PRODUCTS

electrodes • wires • fluxes

Check 5625 opposite last page

taste and odor control and S-PAC which is impregnated with a harmless inorganic desiccating material to increase moisture control capacity. Desiccant does not affect S-PAC's inherent taste and odor removal qualities.

Tubes are made in standard range of sizes or are furnished in special designs to handle unusual problems. Their weight ranges from one to six grams.

Once odors are adsorbed by activated carbon, they are not released except by special process. A few grains do a big job in Ayerst's vitamin bottles. And, if eaten by mistake, the tubes are harmless.

In addition to pharmaceutical uses, tubes are finding application in rolls of plastic and artificial leather, cartons of chemical bottles, and photographic film storage.

(T-PACs and S-PACs are manufactured by Barnebey-Cheney Co., Cassady at Eighth, Columbus 19, Ohio.)

Check 5626 opposite last page.

Carbon production time cut from weeks to hours in new plant

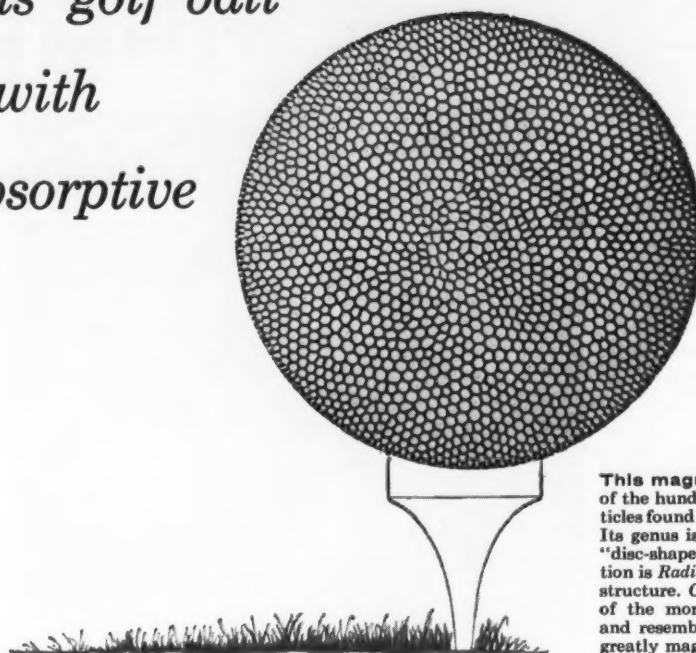
Industrial carbon products that used to take eight weeks to make are being produced in less than eight minutes in National Carbon Company's multi-million dollar plant at Lawrenceburg, Tenn. The process makes it possible to automate carbon production to a high degree, resulting in greater product uniformity.

The plant is producing carbon brick for furnace lining. This is being extended to include wide variety of carbon products, ranging from carbon brushes for motors and generators to large carbon blocks.

Heart of the process is a specially designed hydraulic press that operates on an average pressure of several tons per square inch. High electrical currents simultaneously heat the product to baking temperature while it is in the mold.

Low-voltage, high-current power transformers supply the

What's this "golf ball" got to do with greater absorptive capacity?



This magnification shows just one of the hundreds of different shaped particles found in Celite diatomaceous earth. Its genus is *Coscinodiscus* which means "disc-shaped sieve." Its species designation is *Radiatus* which refers to its radial structure. *Coscinodiscus Radiatus* is one of the more common marine diatoms and resembles a "golf ball" only when greatly magnified.

It's a particle of CELITE that absorbs more than

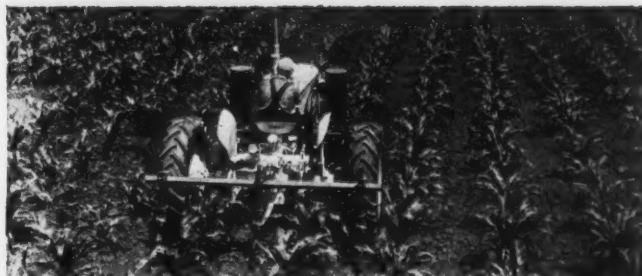
The secret of diatomite's remarkable properties is shown in this photomicrograph. The infinite variety of particle shapes and sizes gives Celite diatomite its exceptional performance characteristics in a wide range of process applications. The large percentage of voids both between and within particles like the "golf ball" provide porosity for high absorption.



Johns-Manville CELITE

CHEMICAL PROCESSING

Helps polishes soak up oil and dirt. In polishes for silver, other metals, glass and airplanes as well as automobiles, Celite absorbs residual oil, dirt and other solid matter. In addition, Celite imparts a delicate non-scratching polishing action.



Provides free-flowing fertilizers for uniform coverage. In ammonium nitrate fertilizers, highly absorbent Celite particles form a protective coating which helps prevent contact between crystal faces... thereby minimizing caking and assuring good flowability.



Controls viscosity in adhesives for corrugated paper. For precise control of viscosity and surface penetration, manufacturers of many types of adhesives rely on Celite's excellent absorptive capacity.

-the diatomite mineral filler twice its weight of liquid

Mix 100 cc of water with 100 grams of Celite*... the water is so completely absorbed that the mixture exhibits all the properties of a dry powder. This demonstration is visible proof of the high absorptive capacity of Celite diatomite fillers. Actually it will absorb 2 to 3 times its own weight before reaching its liquid holding limit. The reason is that approximately 93% of a given volume of Celite is composed of air spaces or voids. Despite its highly porous nature, however, Celite does not absorb moisture from the air.

In addition, Celite has many other unique properties which give it wide application as a mineral filler. Its high bulk—a cubic foot weighs only ten pounds—reduces outage in packaged powder products and provides the needed bulking action in many other formulations. The irregular shape of the particles and their hard silica structure adds reinforcing strength to paints and plastics. Other uses include concrete, insecticide diluent, paper and as a source of silica in "water glass" and "lime-silica" insulating materials.

Produced from the world's purest commercially available diatomite deposit, Celite comes in a wide range of grades. Each grade is carefully controlled for complete uniformity.

Ask your nearest J-M Celite engineer to tell you how Celite can help solve your formulation problems. He's backed by Johns-Manville's extensive research facilities and years of practical diatomite experience. Call him today or write Johns-Manville, Box 14, New York 16, New York. In Canada, write Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

Industry's most versatile MINERAL FILLER



Check 5627 opposite last page

current. Depending on size of product being made, currents range from 3000 to 100,000 amperes. Temperatures are around 2000°F.

The electrical heating raises the temperature of the entire mass simultaneously, with uniform generation of heat throughout the product. Done under high pressure, this results in carbon products of very high quality.

The company has developed a special blending technique for the raw materials. It provides enough contact between particles to lower the electrical resistance to the point that permits initial flow of current.

As the current heats the mixture, the binder in the mix is melted, and the pressure of the press forces it throughout the mixture, resulting in a thorough and complete mix. The telescoping of operations results in the substantial shortening of the production cycle.

Carbon technology in the past has consisted of using a mix of carbon flour and some form of tar or pitch as binder. The mix was heated to near the melting point of the binder, cooled, and extruded to shape in presses. Products were then placed in gas-fired furnaces and baked for several weeks.

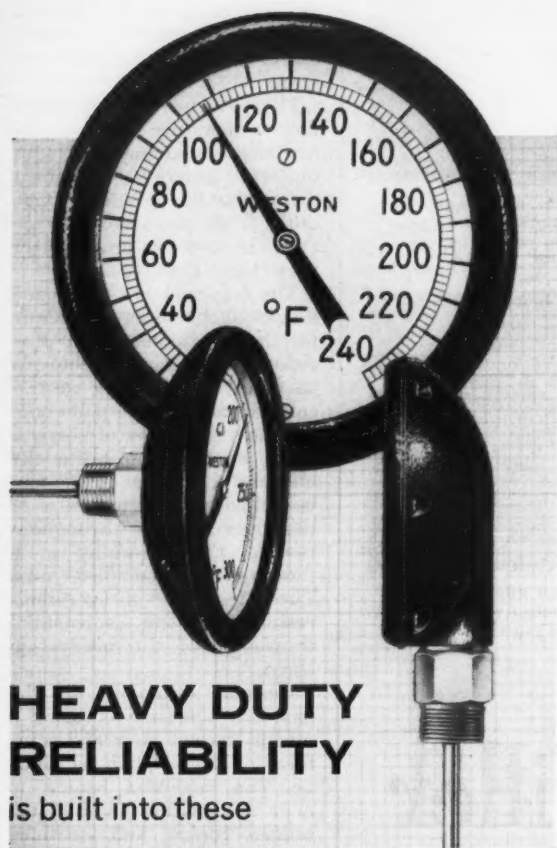
(Carbon product manufacturing process was developed by National Carbon Company, Division of Union Carbide Corporation, 30 East 42nd St., New York 17, N.Y.)

For the ambitious man

Within the 48 pages of this booklet explaining the organization of a business education institute, the basic structure of business is analyzed. You are shown what you must do to achieve success. You are introduced to the men behind this program and some of the famous executives who have benefited from it. "Forging Ahead in Business"—Alexander Hamilton Institute, 71 West 23rd St., New York 10, N. Y.

Check 5628 opposite last page.

WESTON THERMOMETERS: STANDARDS OF STABILITY IN SCIENCE AND INDUSTRY



HEAVY DUTY RELIABILITY

is built into these

WESTON BIMETALS

For lasting accuracy, even under punishing conditions, you can depend on Weston heavy duty bimetal thermometers. Exceptionally stable sensitive elements . . . corrosion-proof, pressure-tested stainless steel stems and connection nuts . . . rugged forged brass heads . . . suit these bimetals for the most strenuous service. Accuracy is assured within 1% of full scale range. 20 standard ranges: running from -100° to 1000°F or -100° to 400°C. Standard stem lengths from 2½" to 72".

Model 2221: has a 5" diameter head with 9" scale.

Model 2231: 6" diameter head with 12" scale.

Model 1221: straight form—basically the same as Model 2221, but with scale parallel to stem. Stem can be located in any one of 24 positions around the periphery of the head.

For full information, call your local Weston representative, or write to Weston Instruments, Division of Daystrom, Inc., Newark 12, N. J. In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 10, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.

WESTON



Instruments

Check 5629 opposite last page



PROCESS INSTRUMENTATION & LABORATORY APPARATUS

Saving money and time, semi-automatic moisture balance is located right in the plant where its simplicity, speed, and accuracy are strong points. Here the malthouse operator notes results of moisture test on steeped grain with approximately 50% moisture content



CP Staff Photo

'Rapid moisture' unit takes moisture tests out of the laboratory and puts them on the production line — where they're needed. Albert Schwill and Company finds semi-automatic moisture tester . . .

cuts costs . . . and saves time on critical steeping process

WILLIAM C. CLARKE, Assistant Editor
With **LLOYD E. FORSELL**, Plant Manager
Albert Schwill and Company
Chicago, Illinois

Problem: Including the time required to take the sample to the laboratory and phone back results, approximately four hours were required to secure results on a moisture test at Albert Schwill and Company. Because critical process of steeping barley when manufacturing malt should be controlled precisely throughout a moisture range of 35 to 52%, depending upon type and condition of grain used, management wanted a faster method. Usual moisture tests by ASBC (American Society of Brewing Chemists) methods require samples be oven-dried at temperatures of 103-104°C for 180 minutes. Preparation of sample, and calculation of results, requires more time.

Another factor was availability of tests from the laboratory. The plant laboratory is on an eight-hour five-day basis whereas the plant runs twenty-four hours a day, seven days a week. Obviously, only



CP Staff Photo

Percent moisture appears on counter at upper left. Both time and temperature are adjustable by dials at bottom of balance

by close scheduling of the steeping process could this bottleneck be avoided. When steeping could not be scheduled so moisture tests could be run during regular hours, a laboratory analyst was required to work nights and week-ends.

Solution: Approximately four months ago, an infrared semi-automatic single-

pan balance and moisture determinator was purchased. After a series of extensive tests in the plant laboratory to determine accuracy, the unit was placed in the plant and the malt house operators instructed in its use.

The instrument weighs the sample and automatically determines moisture directly in percent. Result of the determination is preserved on a counter, easily read by the operator.

Procedure Is Simple

Sample pans are tared in instrument and filled with ten-gram samples. Test is initiated by placing sample on built-in torsion-wire balance and closing cabinet cover. Operator then sets two controls and the built-in infrared metallic heating element begins its heating cycle. Operation from this point is fully automatic. After a pre-set time interval, the heater turns itself off and percentage of moisture is registered on the three-digit counter. At the same time the infrared heating element is moved by a spring motor from over the sample. Complete test requires only thirty minutes.

Results: Moisture control of the steeping process has been transferred from the laboratory to the production floor of the malthouse because of the "rapid moisture" test unit. The malthouse operator now knows the moisture level in thirty minutes as contrasted with the former four hours. The operator is able to run tests on the steep-house batch, which is large enough to produce 4000 barrels of beer, every half hour, securing readings to within 0.1 percent of the former laboratory results.

Not only does use of the instrument save time in the malthouse, but costs have been reduced with elimination of the need for laboratory analysts to work week-ends and nights. Overall production costs have been reduced with the closer control of moisture that is possible. Quality of product has been improved by closer correla-

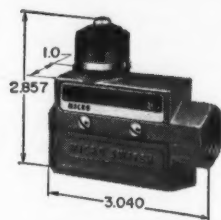


MICRO SWITCH Precision Switches

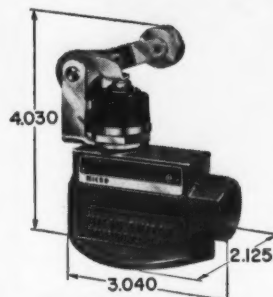
New "E6" and "V6" Enclosed Switches available in 6 actuator designs

With new ease of installation, improved insulation and sealing, heavier wall sections without change of envelope dimensions, these new switches are interchangeable with our "E" and "V" designs.

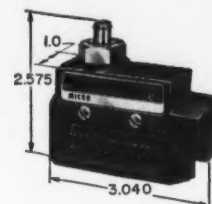
Available in six integral actuator designs to meet most precision switch requirements. All six are available in either side mounting (E6) or bottom mounting (V6) style.



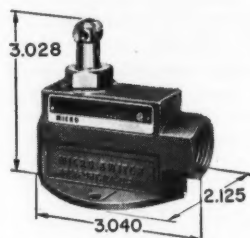
Plunger actuator for straight, in-line operating motion with controlled overtravel. Elastomer actuator boot protects against dirt and moisture.



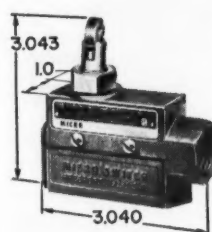
Roller lever actuator for cam or slide motion, adjustable horizontally through 360°, vertically through 225°. Elastomer actuator boot.



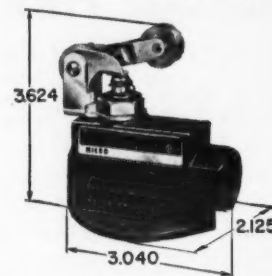
Plunger actuator for straight, in-line operating motion with controlled overtravel.



Roller plunger actuator for slow-rise cam or slide motion with controlled overtravel. Roller in line with case.



Roller plunger actuator for cam or slide motion with controlled overtravel. Roller at 90° angle to case.



Roller lever actuator for cam or slide motion, adjustable horizontally through 360°, vertically through 225°



New switch design lets terminal screws project from top portion of the housing. Wiring is easy. Gasket and insulator are one-piece, cemented to bottom housing . . . fewer parts, no separate gasket. The new elastomer insulator-seal provides better insulation and a tighter long-life seal. New housings have thicker walls and greater strength, yet have same outside dimensions and same mounting holes as "E" and "V" switches. New hex-shaped (instead of round) conduit hub greatly facilitates tightening conduit connection. Basic switch is replaceable in all cases. Send for Data Sheet 145.

MICRO SWITCH . . . Freeport, Illinois, A Division of Honeywell

The two-word name MICRO SWITCH is NOT a generic term, It is the name of a division of Honeywell.



Honeywell

MICRO SWITCH PRECISION SWITCHES

Check 5630 opposite last page



THE USG "PILOT"—Case: 8½" Square and 4" Deep

A COMPACT, LOW-COST* INDICATING PNEUMATIC CONTROLLER

for pressure . . . temperature . . . other variables

(1) Control modes to suit your process: Two-position with differential gap (1 to 100%) . . . proportional (1 to 150%), alone or with automatic reset or rate action. Control mode or control action (direct or reverse) easily altered in field.

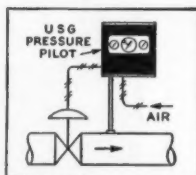
(2) Variable and set point both indicated on large dial: Black pointer indicates reading on 3½-inch dial (6¼-inch scale length). Red circle-tipped pointer spots location of set point.

(3) High accuracy and sensitivity at low cost: Accuracy of 1% of range over middle half of scale. Sensitivity less than 0.1% of scale at 100% proportional band setting . . . compares favorably with higher-priced controllers.

(4) Simplified maintenance and repair: Precalibrated measuring element can be removed for range change. Other basic components, even entire control chassis, can be removed for easy maintenance.

(5) Controls a broad range of variables: Pressures from 30" Hg vacuum to 10,000 psi. Temperatures from -350 F to + 1000 F. Can be adapted to control many other variables, including liquid level.

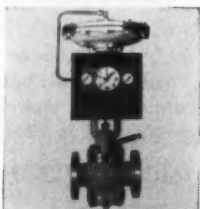
*Sample price: \$126.00 for unit with 316 S.S. Bourdon tube, range 0-600 psi, proportional control 1-100%.



Typical pressure reducing service



Can be panel or surface mounted



Can be valve mounted



Write for Catalog 510 . . . Gives complete specifications and description of the USG Pilot as well as pneumatic transmitters and receivers for process instrumentation. Send for your copy today, or contact your nearest USG distributor.

UNITED STATES GAUGE
DIVISION OF AMERICAN MACHINE AND METALS, INC., SELLERSVILLE, PA.



Check 5631 opposite last page

INSTRUMENTS & LAB

tion between moisture and other processing variables.

Since manufacturer recommends use of the instrument over the range from 1 to 100% moisture, plans are being made to test its use in another application below 6% moisture, but as yet no work has been done. Results have been entirely satisfactory in the area between 35 and 52% moisture.

(I-R Moisture-Matic balance is available from Scientific Products, division of American Hospital Supply Corp., 2020 Ridge Avenue, Evanston, Illinois.)

Check 5632 opposite last page.

Accurately measures 'difficult' flows

Magnetic flow meter has unrestricted flow line

Uses: Providing remote indication, recording, controlling or integrating of flow rate of "difficult" liquids as slurries, paper pulp, concentrated acids, and waste sludges.

Features: Magnetic flow meter permits unrestricted flow line. Installation is unaffected by piping configurations and measures flow in either direction.

Description: Magnetic flow meter operates by measuring difference between a reference voltage and signal voltage developed as a result of flow volume. Indication produced is independent of power voltage and frequency.

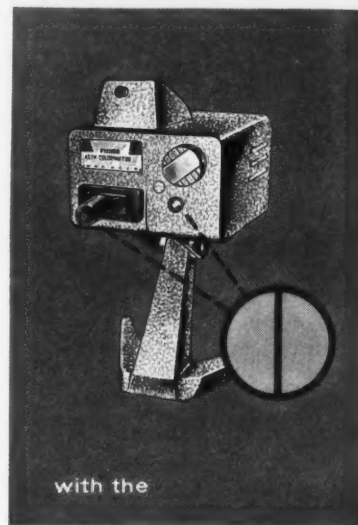
Instrument has repeatability of ½ percent of full scale. Accuracy from 0-3 ft per second and above is ±1% full scale.

Instrument can be substituted directly into existing pneumatic flow control or ratio control systems. Manual adjustment is provided to set desired flow value at full scale. Voltage changes are between 90 and 125 volts. Frequency changes between 55 and 65 cycles have no effect.

(Magnetic flow meter is product of Fischer & Porter Company, 458 Jacksonville Rd., Hatboro, Pa.)

Check 5632A opposite last pg.

Take advantage of the NEW ASTM COLOR SCALE for petroleum products



FISHER ASTM COLORIMETER designed for ASTM method D-1500

Adoption of the new ASTM Color Scale has been the greatest advance in years in the measurement of petroleum colors. Now laboratories can compare their products with the first scientifically selected color standards.

The Fisher ASTM Colorimeter employs the 16 ASTM color standards in an exceptionally convenient instrument with adjustable illumination, turret mounting, other modern features. With the ASTM Colorimeter, color measurements are reproducible from operator to operator, laboratory to laboratory.

The Fisher/Tag Saybolt Chromometer supplements the ASTM Colorimeter as the official instrument for products lighter than 0.5 on the new ASTM scale.

NEW BOOKLET AVAILABLE
Send for this detailed account of the Fisher ASTM Colorimeter and other instruments for measuring the colors of petroleum products.
103 Fisher Building
Pittsburgh 19, Pa.



**FISHER
SCIENTIFIC**

IN THE U.S.A.: Chicago Philadelphia IN CANADA
Boston Cleveland Pittsburgh Edmonton
Buffalo Detroit St. Louis Montreal
Charleston, W.Va. New York Washington Toronto

America's Largest Manufacturer-Distributor of
Laboratory Appliances & Reagent Chemicals

Check 5633 opposite last page

CHEMICAL PROCESSING

THAT'S
INTERESTING

Better models

At the World's Fair, Brussels, America's model craftsmen competed with the best Europe can produce. Model reforming unit featured inside U.S. Pavilion was as true to scale, colorful and intricately detailed as the most carefully crafted models made in Europe. All components, except for the towers and furnaces which are specially fabricated, scaled $\frac{3}{8}$ " to 1", use parts preformed from plastic. A technique using models for all process design and layout can virtually eliminate the usual drawings. M. W. Kellogg Company used technique in designing of chemical plant.

Exhaust control

Calculations by the Air Pollution Foundation state that auto exhaust control will range from \$50 to \$85 per year per automobile. Calculations include all facts that will effect the yearly bill of an auto owner.

For more information on product at right, specify 5634 see information request blank opposite last page.



Newly designed Type H Motor Control



More room for optional features

Now, with Allis-Chalmers high voltage control, you get more panel space for additional components.

Meters, pushbuttons, instruments, rheostats, indicating lights, relays, and other components can be installed—thanks to the ample space available on both the outer door and inner barrier.

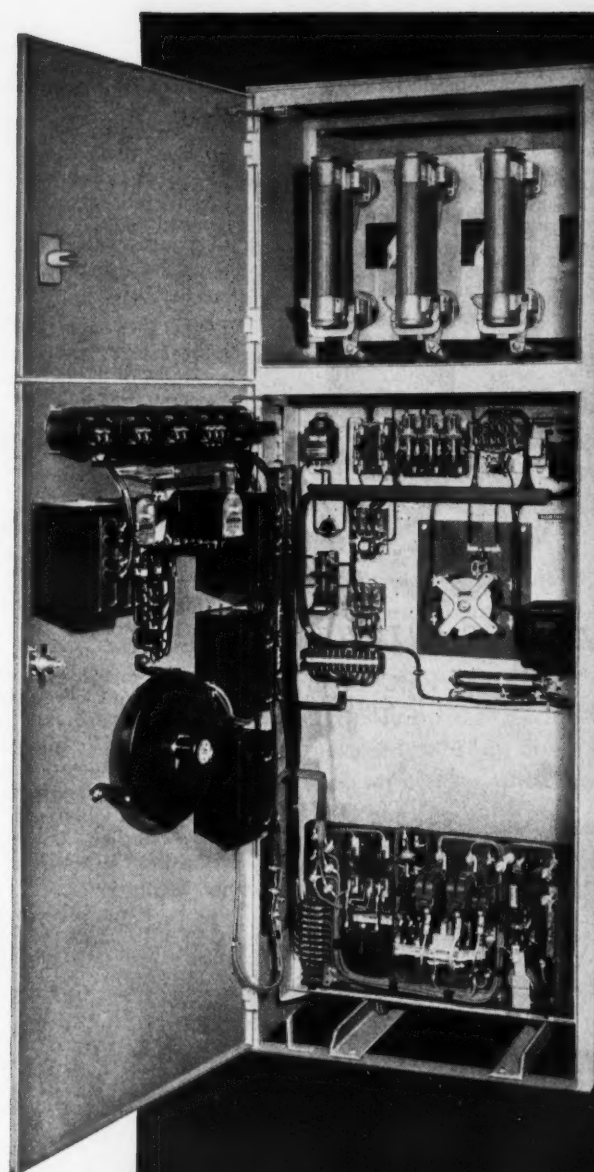
Along with more room, this new A-C design is front accessible, has smaller cabinet size, provides ultimate in protection for men and machines, and has been completely tested.

For more information on this engineering advance, contact your A-C office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

All this area on Allis-Chalmers new Type H motor control is available for optional features. In many applications, this extra space eliminates the need for an extra cabinet.



Removable panel, on which control devices are assembled, is mounted on inner barrier. Entire panel may be quickly removed for inspection and maintenance.



ALLIS-CHALMERS

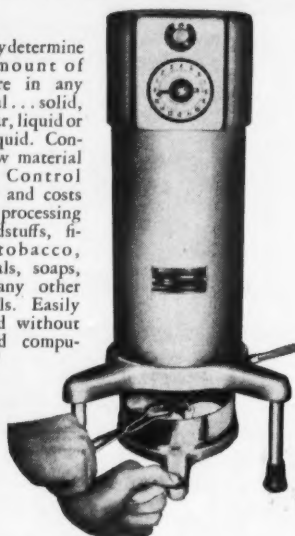


A-5519

Highly accurate
**MOISTURE
ANALYSIS**
in a few minutes

**DIETERT-DETROIT
MOISTURE TELLERS**

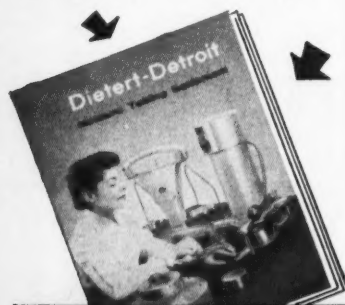
Quickly determine the amount of moisture in any material... solid, granular, liquid or semi-liquid. Control raw material costs. Control quality and costs in the processing of foodstuffs, fibres, tobacco, chemicals, soaps, and many other materials. Easily operated without involved computations!



12 PAGE CATALOG

CATALOG NUMBER SL-1 sent without obligation. Lists various models to suit material to be tested for moisture. Includes data on Dietert-Detroit drying ovens, speed desiccators, etc.

on request



HARRY W. DIETERT CO.
CONTROL EQUIPMENT

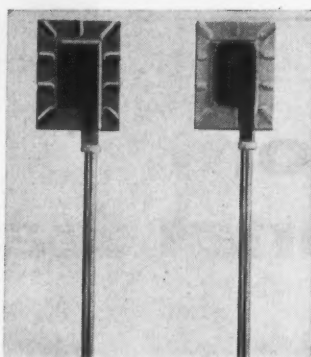
9330 ROSELAWN DETROIT 4, MICH.

Send me Moisture Testing Catalog SL-1

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____

Check 5635 opposite last page

INSTRUMENTS & LAB



Surface temperature...

... detectors can be welded or cemented to any surface, flat or curved, metallic or non-metallic, covering ranges from -400 to +1550°F. Iso-thermal system thus formed gives a true skin-temperature reading.

(Type 1375 and 1376 surface-temperature transducers are products of Trans-Sonics, Inc., Burlington, Mass.)

Check 5636 opposite last page.

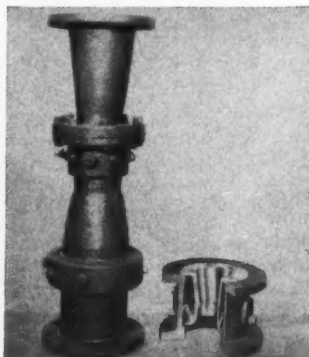
**Short Venturi flow tube
has low head loss**

Measuring accuracy is not impaired

Uses: Metering water, sewage, air and other fluids and gases.

Features: Venturi flow tube is much shorter than other designs, yet measuring accuracy is not impaired.

Description: Originally designed in Germany, instrument



Shorter length of Venturi as compared with another design

For Tough Separation Problems...

Use
**Anderson
Hi-eF
Purifiers**



There are three basic reasons why more Anderson Purifiers, Scrubbers, Mist Extractors and Separators are used to solve tough separation problems than any other make. First, they have no moving parts, filters or screens that wear out or demand replacements. Second, since they need no large areas for filtering or screening they are extremely compact.

Third, you receive a performance guarantee with each unit.

THE V. D. ANDERSON COMPANY

division of International Basic Economy Corporation
1948 West 96th Street • Cleveland 2, Ohio
See the Chemical Engineering Catalog



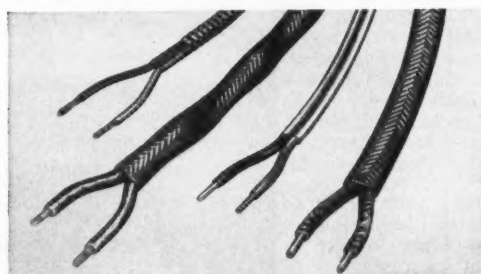
FREE PURIFICATION BOOKLET shows how to separate any liquid or entrainment from gases and vapors. Write for copy today.



PURIFIERS • SCRUBBERS • SEPARATORS • MIST EXTRACTORS

Check 5637 opposite last page

Thermocouple Wires
Quality • Variety • Delivery



Thermo Electric makes thermocouple and thermocouple extension wires for every possible use—actually over 1500 varieties. Just a few seconds with a T-E Wire Catalog will find the exact type you need. Solid and stranded conductors are available in all standard calibrations. The most modern types of insulations will meet all conditions of moisture, chemical action, abrasion and high temperature. Our own complete facilities for wire drawing, insulating and calibrating guarantee you unmatched quality. Prompt delivery on most types from our large stock.

Write for New Wire Catalog No. 32-R

Thermo Electric Co., Inc.
SADDLE BROOK, NEW JERSEY
In Canada—THERMO ELECTRIC (Canada) Ltd., Brampton, Ont.

Check 5638 opposite last page

is simple in principle. Low pressure is taken from a hydraulically streamlined body instead of from a wall. Body is placed in center of narrowest cross-section, at a point at which pressure is further lowered by locally increased velocities around it. Thus, higher pressure differential is obtained without materially changing energy conversion in the tube. However, head loss remains practically the same. By selecting a proper area ratio, larger differential is obtained without increasing loss. By choosing a larger area ratio, loss is even smaller, and measuring accuracy is not impaired. Venturi tube is available in range of sizes.

(Twin-Throat Venturi Tube is product of Inflico, Inc., PO Box 5032, Tucson, Arizona.)

Check 5639 opposite last page.

Lab equipment

Over 250 items including laboratory shakers, rotators, air pumps, cathetometers, and electro-analysis apparatus are described and illustrated in 43-page manufacturer's Cat 57G — Eberbach Corporation, PO Box 63, Ann Arbor, Mich.

Check 5640 opposite last page.

Coulometric analyzer is regulated to within $\pm 0.05\%$

Easy to use; results are read in digital form

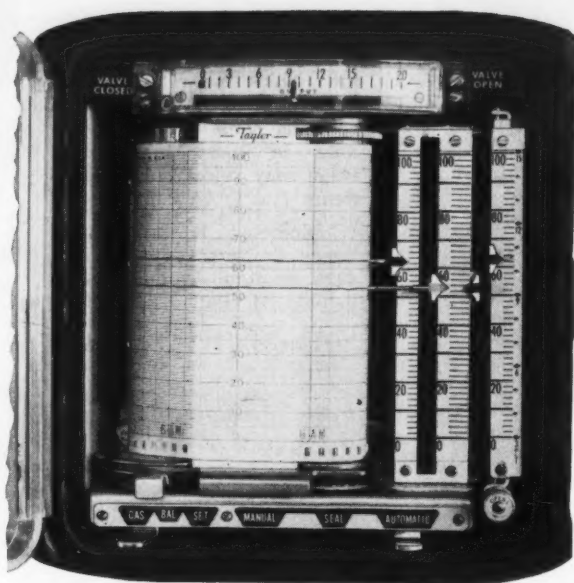
Uses: As quantitative analyzer with applications in many fields, with emphasis on analysis of extremely dilute solutions including acids, bases, oxidizers, and reducing agents.

Features: Coulometric analyzer has an electronic regulator to hold current within $\pm 0.05\%$.

Description: Coulometric analyzer is easy to use, with results being read in digital form. End-point is detected as in an ordinary titration, with color indicator, redox potential, pH measurement, etc.

Instrument is essentially

Complete Cascade System in $\frac{1}{2}$ Normal Space ... Costs Substantially Reduced



*Taylor's
New TRANSCOPE*
Plug-in Recorder
provides a complete
Cascade System... in
half the space required
by other systems*

Never before has a complete cascade system been available in one recorder case in a 6" panel cut-out.

Complete Cascade System. All switches in one case. Operator performs all start-up and shut-down operations in one recorder. No external switches or relays. No extra space needed. Cascade set point always in view.

All Functions in One Case. Master and secondary variables continuously recorded. Master and secondary controller outputs, as well as set points, continuously indicated.

Unique, New Bumpless Transfer. New switching system lets you change from *control by secondary* to *control by master*, precisely matching the master output to the secondary control point without comparing gages.

Front of Panel Control Settings let you make adjustments easier, quicker and better! You can clearly see what you are doing, and the results, because the record is continuous.

Stays on Automatic Control while the recorder is removed. There's no need to shut down the process for instrument service or adjustments.

Substantial Cost Reduction. You save substantially since you need only one case, one chart drive, one panel cut-out, one set point transmitter.

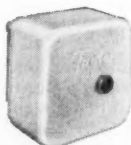
★ ★ ★

For further information about this revolutionary new Recorder, see your Taylor Field Engineer, or write for **Bulletin 98286**. Taylor Instrument Companies, Rochester, N.Y., Toronto, Ontario.

*Trade-Mark

CASE MATES!

The Taylor TRANSCOPE Controller and Recorder are companion plug-in instruments. Together they give new standards of process control performance... unprecedented stability, accuracy and adaptability. Especially suited for the short spans of measurement encountered in present day processing. The TRANSCOPE Controller is insensitive to ambient temperatures, and highly resistant to mechanical shock. Write for **Bulletin 98278**.



Taylor Instruments **MEAN ACCURACY FIRST**

Check 5641 opposite last page

Cut your flow control
costs without sacrificing
performance . . .

DON'T Build a System

Install a
Kates*

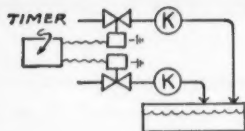


*KATES direct-acting flow rate regulators do the job alone. Merely pipe the liquid into and out of the single unit, set the dial, and you get the exact required flow rate even if inlet-to-outlet pressure jumps or drops as much as 125 psi. Use for clear liquids, light slurries, many suspensions.

Standard units are rated from 0.02-0.20 up to 100-550 GPM. Also available with remotely-operated electrical or pneumatic positioners for remote or automatic adjustment. If required, special units can be supplied for unique applications. Kates regulators eliminate hunting, lagging, and wire-drawing, save space, and simplify installation and maintenance.

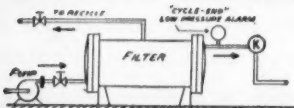
TYPICAL APPLICATIONS

BATCH PROCESS MEASUREMENT



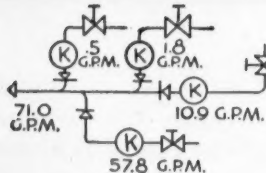
Automatic batch processes are easy when liquid ingredients are fed through Kates regulators and timer-operated solenoid valves. One timer can control all additives since individual flow rates can be set at each regulator. And it is easy to change proportions; just change the regulator settings.

PRESSURE FILTRATION CONTROL



As filter cake builds up, a constant valve-jockeying is needed to smooth out flow. A Kates control in the effluent compensates for rising pressure drop, keeps filter at best rating.

PROPORTIONATE BLENDING CONTROL



Where many ingredients go into one blend, and must be in exact proportion, a control system for each ingredient would cost plenty. But a Kates control on each feed does the job inexpensively, and each unit can be reset for a blend change.

Write for Technical Bulletins No. 561 and 562 — TODAY

Kates

W. A. KATES COMPANY

Department E
430 Waukegan Rd.
Deerfield, Illinois

Check 5642 opposite last page

INSTRUMENTS & LAB

at a titration unit in which end point is reached by using a measured quantity of electricity instead of a measured quantity of standard chemical.

Complete equipment includes an analyzer plus a cell kit, which permits a wide variety of titrations. As kit contains some articles available in most laboratories, users may select only needed items.

(Coulometer is product of Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia 44, Pa.)

Check 5643 opposite last page.

Device measures density for process control of liquids

Can be used to monitor
chemical reactions.

Uses: As density measuring system for controlled proportioning of constituents or control of chemical reactions. Can also be used for monitoring changing specific gravities.

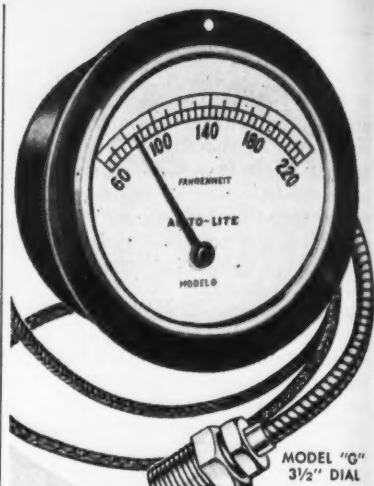
Features: Density measuring system is simple to install; has accuracy to ± 0.001 gram per cc.

Description: Consisting of probe and power supply, system will measure density of liquids during transit, storage, or complete cycle of reaction. Automatic, continuously operating instrument can indicate instantaneous changes, with permanent recordings if desired.

Probe is surface coated to resist solvents and corrosive liquids. System can be used in conjunction with standard recorder or indicator. Unit is not effected by pressures from 0 to 125 psi and will indicate liquid density changes of 0.010 grams per cc in about one second. Standard model has indication range of 0.690 to 1.450 grams per cc. Accuracy is maintained through temperature range of 0 to 100°C.

(Density measuring system model P-625 is product of General Communication Company, 681 Beacon St., Boston 15, Massachusetts.)

Check 5644 opposite last page.



AUTO-LITE

Tells
the Truth
about Temperature

The Auto-Lite Model "G" Temperature Indicator provides low-cost protection against temperature variations in processing and storage operations. This reliable temperature indicator is Auto-Lite engineered for your specific needs . . . offered in 8 types of cases.

- Precision-made . . . convenient remote reading or rigid stem mounting.
- Low cost protection . . . due to large, specialized production.
- Wide selection of dial ranges to meet individualized needs.

Priced from \$19.25.

THE ELECTRIC AUTO-LITE COMPANY
INDUSTRIAL INSTRUMENT DIVISION
TOLEDO 1, OHIO
NEW YORK • CHICAGO • SARNIA, ONT.

Diagrams show 4 of the optional case types.



Send for catalog illustrating and describing Auto-Lite Indicators and Recorders

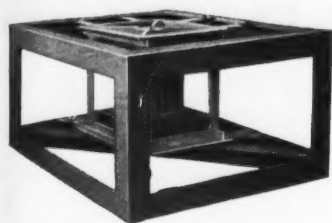
**TEMPERATURE INDICATORS
AND RECORDERS**

Check 5645 opposite last page

CHEMICAL PROCESSING

eccentric loading,
side thrusts,
pile-ups
won't affect the
accuracy of

THE W-C UNI-FORCE PLATFORM SCALE



No matter where or how the load falls, the Uni-Force Scale will deliver a true measurement of weight. Reason for this remarkable performance is the W-C flexural frame arrangement which resolves platform thrusts into a single component of force applied to the load transducer. Flexure mounting eliminates bearings, knife-edges, pivots and other points of concentrated wear and friction. So dependable is scale operation that W-C guarantees an accuracy of $\pm 0.25\%$ of calibrated range and a reproducibility of 1 part in 2000.

The Uni-Force Platform Scale is manufactured in a wide selection of standard capacities. It is supplied as a complete, packaged unit which includes either electrical or pneumatic transmission. Because the transmitted signal can be used to actuate a number of devices, the Uni-Force Scale is readily adaptable to such automatic functions as remote indicating, recording, batching, proportioning . . . just about any weight-controlled operation.

For complete information,
write for Catalog 12.



S.A. 1690

WEIGHING and Control COMPONENTS, Inc.
206-A Lincoln Ave., Hatboro, Pa.

Check 5646 opposite last page

JUNE 1958

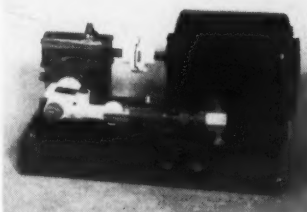
INSTRUMENTS & LAB

**Miniature meter pump
provides accuracy
of $\pm 1\%$**

Capacity is manually adjustable from 0 to 100%

Uses: Accurately metering minute quantities of costly or corrosive fluids, as perfume into soap, dye into cheese, odorants into gases, hydrazine into boiler feedwater.

Features: Metering pump has repetitive accuracy of $\pm 1\%$ percent of full capacity.



Metering pump is highly accurate for metering minute quantities of costly or corrosive fluids

Description: Controlled volume pumps are designed for flow rates to 7880 milliliters per hour and pressures to 1000 psi. Constructed with motor drive action on plunger for suction as well as discharge strokes, pump is driven by 1/3-hp single-phase motor. Pumps may have either single or duplex liquid ends. Maximum capacities per liquid end are 300, 490, 760, 985, 1190, 1970, 3030, and 3940 milliliters per hour. Capacities are manually adjustable from zero to 100% when pump is idle.

(miniPump controlled volume pump is product of Milton Roy Company, 1300 E. Mermaid Lane, Philadelphia 18, Pa.)

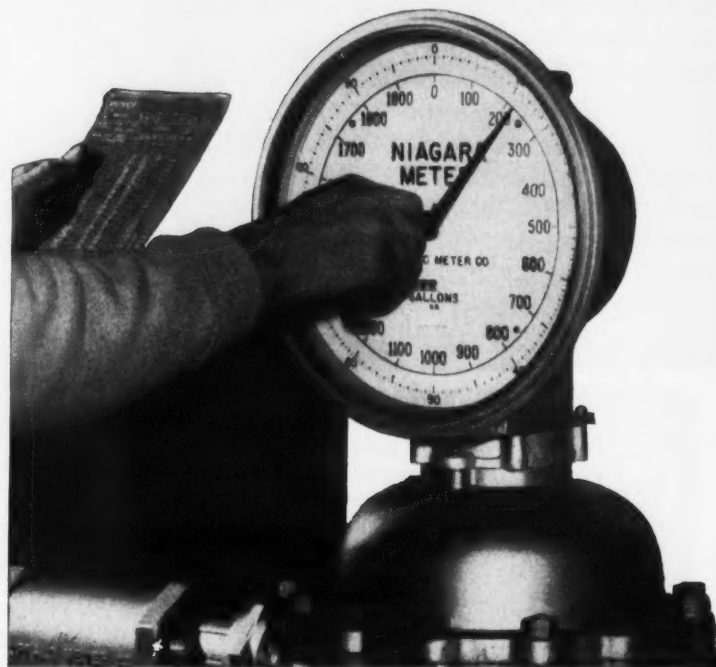
Check 5647 opposite last page.

Electronic regulator unit

Illustrated bulletin of 6 pages describes dual-circuit, fail-safe electronic mill regulator providing precise regulation of line speed, voltage, and tension for continuous-process industries. Bul K-2503 — Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

Check 5648 opposite last page.

You get EXACTLY what you set — No More — No Less!



When you use **NIAGARA** Displacement Meters for process control

Consistent accuracy in liquid measurements is obtained with Niagara Electriccontact Meters. Set the gauge for the number of gallons required and accuracy goes into action. The set number of gallons will be exactly measured through the meter and the flow stopped by the closing of a solenoid valve.

Niagara Meters are of the accurate, positive displacement type. Each Niagara Meter is guaranteed to be individually tested and calibrated at the factory to run within close tolerances at all rates of flow within its rated capacity.

Learn all the facts . . .
Mail the coupon for
complete information.

**BUFFALO
METER CO.**

2892 Main Street
BUFFALO 14, N. Y.

Please send me complete information on
the use of Niagara Electriccontact Meters for
liquid formulations.

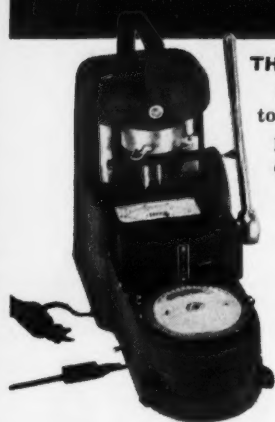
Liquid used.....
Flow G.P.M..... °F.....
Name.....
Company.....
Address.....

Check 5649 opposite last page

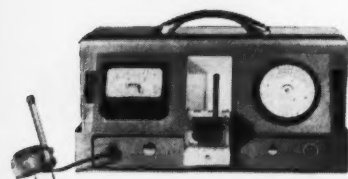
MOISTURE TESTS IN MINUTES!!

Precise moisture tests of any product in minutes with Moore-Milford Testers . . . even with unskilled operators.

Below are only some of the models available to fit almost any need . . . or, Moore-Milford, the world's leading manufacturer of moisture testing equipment and controls, can design special equipment to meet your specific needs for batch testing or continuous testing or regulating. Our entire laboratory and engineering staff are available for consultation and advice.



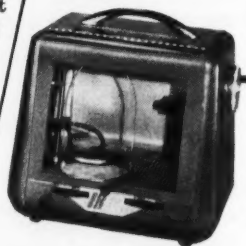
THE UNIVERSAL—For granular or powdered material of less than 1% to over 40% moisture. Extreme high pressure easily applied eliminates effect of varying particle size. High pressure plus proven electrical circuits permit precise test after test reproducibility. Direct reading. Available in 4 models depending on range and portability required.



THE ELECTROPROBE—Finest tester available for semi-liquid and semi-solid formulated products—even during cooking cycle. Results in seconds. Direct reading. Battery or line operated models.

All instruments fully guaranteed.

THE I-R—For any product that can be dried by heat. Built-in timer and heat control both infinitely variable. Automatically weighs sample after testing and preserves result on 3-digit counter.



Call or write today for further information on these and other models, or for free consultation on your problems.

MOORE-MILFORD CORPORATION

Manufacturers • Engineers • Consultants

8034 N. Central Park Ave. • Orchard 4-3220 • Skokie, Ill.

Check 5650 opposite last page

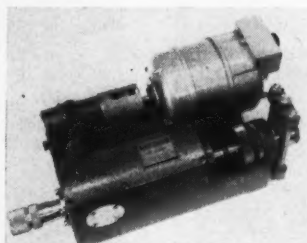
INSTRUMENTS & LAB

Micro metering pump has micrometer flow adjustment

Provides small, constant — yet variable — flow

Uses: As micro metering pump for laboratory use where a small constant flow is required with facilities for infinitely varying the flow.

Features: Flow from pump is controlled with micrometer adjustment of pump plunger.



Laboratory metering pump

Description: Two models are available. One has capacity from 0 to 7 cc, 0 to 160 cc, 0 to 1500 cc at pressures to 200 psi. Second model has capacities from 0 to 9.8 gph at 2000 lb psi.

Pump bodies are manufactured of stainless steel. Motors are totally enclosed and drive through a single worm-gear reduction. Valves are duplicated to insure constant flow at pre-set conditions.

(Micro Metering Pumps are products of Marton Equipment, Inc., Beverly, Mass.)

Check 5651 opposite last page.

Teflon-protected valve controls corrosive fluid flows

Valve even has Teflon end-connections for coupling

Uses: Controlling flow of corrosive product at low rates of flow.

Features: Body, stuffing box, integral seat, and internal ports of control valve are machined from a solid block of Teflon.

Description: All-Teflon components are encased in a stainless steel housing. Plug



MAISCH

METERING PUMPS

- STAINLESS STEEL — OILLESS BEARINGS — STERILIZABLE
- POSITIVE DISPLACEMENT — SMOOTH, NON-PULSATING FLOW
- FOR HOT, COLD, VISCOUS OR WATERY FLUIDS
- ACCURATE WITHIN 1 TO 2%

Maisch Metering Pumps are simple in design, ruggedly built for long service, and can be depended on to maintain accuracy indefinitely. Exclusive design features insure optimum performance. Particularly suited for handling chemicals, syrups, oils, glue, processing solutions, etc. Quick demountable or fixed heads. Fixed capacity pumps available in wide range of output. Pumps in stock for immediate delivery. Write for complete details and prices.

MECHANICAL PRODUCTS CORPORATION

174 North Ogden Avenue • Chicago 7, Illinois

Check 5652 opposite last page

TRENT PACKAGED CIRCULATION HEATERS

for Water, Oil, Brine, Air and Various Gases

- Water—Superheat
- Oil, Oil Burners, Heat Transfer Liquids
- Brine, Defrost Applications
- Air, to High Temperatures—Test Work
- Gases, Hydrogen, Nitrogen, etc.

The unique design of TRENT "Packaged" Circulation Heaters eliminates return bends in the heating tubes . . . to assure free, uninterrupted flow of liquid through the heater—at the exact velocity you require! This means faster, more efficient heating for all types of process equipment.

TRENT SOH Oil Circulation Heater
TRENT SWH Water Circulation Heater
furnished fully equipped with

- All-Welded Companion Pipe Assemblies with Insulation
- Indicating or Non-Indicating Thermostats for High Temperatures
- Rugged Outer Casings with Mounting Tabs
- TRENT Multi-Tube Flanged Immersion Heater Unit
- Mounted 6" square Terminal Box

Let a TRENT engineer determine the TRENT "Packaged" Circulation Heater best suited for your operation . . . or custom-engineer one to meet your special wattage and voltage requirements.

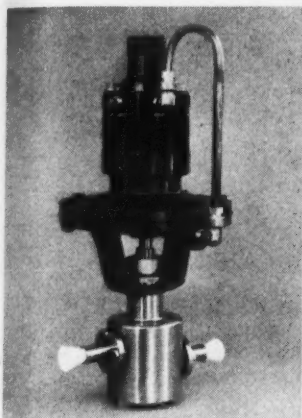


Electrically Heated Industrial Equipment
235 LEVERINGTON AVE., PHILA. 27, PA.
In Canada Supreme Power Supplies Limited, Toronto 14

Check 5653 opposite last page

CHEMICAL PROCESSING

and stem are one, machined from Teflon and reinforced with stainless steel. Spring loaded, Teflon chevron rings maintain a tight stem seal. Valve even has Teflon end-connections for coupling.



All components of valve in contact with fluid are of Teflon

Flanges are $\frac{1}{2}$ " — $1\frac{1}{2}$ ". Plug will be characterized and calibrated to meet requirements within range from 0.003 to 1.4 Cv, with maximum range-ability of 50 to 1.

(Model B-2260 Control Valve is product of George W. Dahl Company, Inc., 430 High Street, Bristol, Rhode Island.)

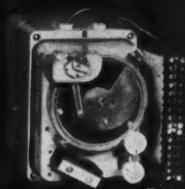
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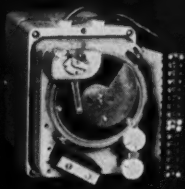
62-52-59

"For an expert on fuel mixtures you make lousy coffee."

Recording Unit for Variable 1



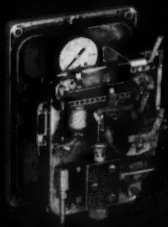
Recording Unit for Variable 2



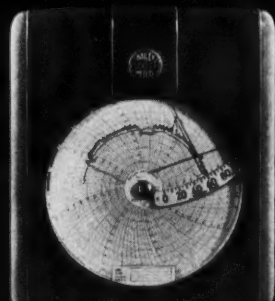
Controlling Unit for Variable 1



Controlling Unit for Variable 2



Units added to Recorder-Controller as needed



Bailey Recorder is key to "step-by-step" automation

When you are pioneering a new process and don't know all the answers, complete automation is seldom practical. The first step is to identify your variables and measure them. Nothing does this job better than a Bailey Recorder. One instrument can record any four variables that can be converted to electric or pneumatic signals.

Once you get a better understanding of the variables in your process, you will want to add controls and feed back your measurements. Here's where the versatility of the Bailey Recorder comes into play. For the same Bailey instrument you use to record variables is designed to accommodate plug-in control units.

When you use a Bailey Recorder, you can build your instrumentation along with your process. At the start, you use only the plug-in units for recording. Then you add plug-in controls as you see the need for them.

For the complete story of how you can use a Bailey Recorder for step-by-step automation, see your Bailey Engineer.

G-42-1

Instruments and controls for power and process BAILEY METER COMPANY

1074 IVANHOE ROAD • CLEVELAND 10, OHIO

In Canada—Bailey Meter Company Limited, Montreal



Check 5655 opposite last page

control small flows with finger tip accuracy

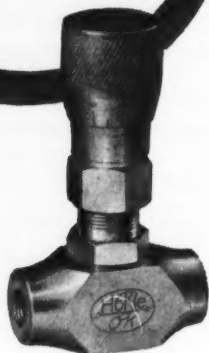
on

Aircraft and
Automotive Test Stands
Hydraulic Equipment
Pneumatic Equipment
Gas Analyzers
Metering and
Proportioning Equipment
Pilot Plants
Test Instruments

280 SERIES

METERING VALVES

Two orifice sizes of 1/16" and 1/8" are available with flow controlled by an 8-degree needle point taking 20 turns to move from open to closed position. In brass with O-ring stem seal or in 316 stainless with Teflon packing. For service to 3,000 psi; operating temperatures from -60° to 450°F. All valves have panel mounting lock nut.



Vernier Modifications

Hoke's #280-25 micrometer hand-wheel kit (illustrated) helps you establish a reference point as to the number of turns required for any flow rate. A low-cost, high-value accessory for precision control.



*Why buy big
when you can
buy small*



A SPECK OF DUST in metered fluid is all it takes to change the orifice setting in Hoke's highly-sensitive 280 Series valve. For critical metering requirements, it's always wise to use this 540 Series Micron Filter to keep foreign matter away from the valve. Complete information on request.

Hoke's Catalog MV-957 has all necessary information on 280 Series Valves and 540 Series Micron Filters. Yours for the asking.

HOKE INCORPORATED
FLUID CONTROL SPECIALISTS
145 South Dean Street
Englewood, New Jersey

Check 5656 opposite last page



Operator holds basic vibrator unit in making a sift analysis. In other operations, unit is fastened to different attachments. Sonic energy can be applied to mixing, beating, stirring, emulsifying, dissolving, and other applications in laboratory

Developed in Germany, and used for many years in Europe . . .

sonic sifter-filter

- high speed
- for wet or dry analysis

reduces laboratory test time



High-speed sift analysis on six small screens. Electro-magnetic vibrator and transformer are at left. Analytical results can be easily determined by weighing already tared, precisely sized sifter screens. Sonic energy is transmitted to sifter screens by holder (top right)

Uses: Particularly adapted for quality-control analysis and supervision of processes in which size distribution can be important factor, sonic sifter-filter can be used for either wet or dry material analyses.

Features: Long-wave sonic analytical sieve is easily adapted to homogenizing and emulsifying small laboratory-size batches, or dissolving, beating, mixing laboratory material. Different effects are achieved with various attachments. Apparatus is reported to have five times the capacity of more conventional units.

Description: Developed in Germany and already used for many years in Europe, high-speed sonic sifter-filter can radically reduce laboratory test time required for distribution-size analyses. Instrument consists of a small electro-magnetic vi-

brator unit, with amplitude control, and various attachments. Other components include a permanently connected transformer, support to allow unit to be clamped to table top, and other accessories, including special screens. Standard attachments are perforated disc, vibrator disc, and cone.

Here's the Theory

In contrast to the action of many industrial sifters, the sonic screen system uses a fundamental frequency in the lower sonic range. This is introduced through an electrical control system to an electromagnet which transmits this energy direct to screen area. Superimposed upon this fundamental frequency is a series of harmonics (integral multiples of the fundamental frequency) which create violent vibratory action with very little flexing of screen itself . . . the screen moving only within a 2-millimeter range. These harmonics often build up the basic oscillation of 120 cycles per second to more than 6000 cps.

Intense vibrations are carried uniformly to every part of screen. Since the mesh is agitated directly, while the frame holding the screen and its support remain stationary, a saving in energy is possible. This is said to be one of the efficiencies of unit.

Oscillations spread out across the sonic screen from connecting arms — as ripples radiate from a stone dropped in a pool of water. As they do, their waves begin to overlap, thus building up the vibration and increasing effective frequency, insuring that there will be no dead areas on screen to cause clogging.

Wet or Dry Analysis

Wet-analysis sieve consists of the long-wave sonic apparatus plus a feed funnel, drip tray, and suitable glass retorts and funnels. During sift analysis, a thorough washing with water and other fluids



UNITRON SEMI-CONDUCTOR RECTIFIER



Simplicity means dependability. Cutaway model of 20 parallel connected cells reveals how insulated conductors pass through iron laminations.

CURRENT EQUALIZER PROLONGS CELL LIFE AND ASSURES CONTINUITY OF SERVICE

If connected in parallel, semi-conductor rectifying cells will divide the total forward current unequally, due to the difference in forward resistance, causing overloading of the cells with the lowest forward drop.

To make each cell assume its portion of the forward current, the **UNITRON** uses the current equalizer illustrated above so as to permit parallel operation of random selected cells.

The equalizing action is illustrated by Figs. 1 and 2. None of the parallel connected cells is overloaded at rated current and therefore each cell conducts as if it were fed from a separate power source. This materially extends cell life and results in low cell maintenance cost and minimum downtime.

For your new d-c power source, get the economy and dependability available only in the new I-T-E **UNITRON** Semi-Conductor Rectifier. Write for information. I-T-E Circuit Breaker Company, Transformer & Rectifier Division, 19th & Hamilton Sts., Philadelphia 30, Pa.



I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA

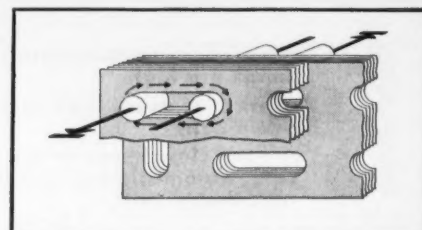


Fig. 1. The two conductors passing through the same window of the iron laminations comprise a 1 to 1 ratio transformer. The currents in the conductors must be equal except for the magnetization current, which does not exceed a maximum of $\pm 10\%$ of cell current.

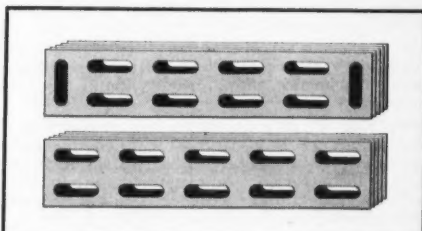
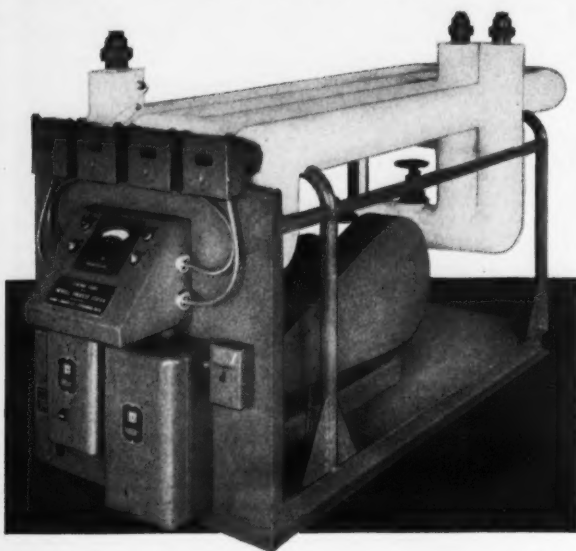


Fig. 2. The iron laminations are divided into two sections, with windows arranged alternately. The windows, when followed progressively in a clockwise direction, form a complete chain in which balance always exists between the current in any one conductor and the currents in the two neighboring conductors.

Check 5657 opposite last page

HI-TEMPERATURE LO-PRESSURE

**liquid phase
heat transfer systems**



if —Your product temperature requirements are high
—You want to avoid high pressure equipment
—You need close temperature control and safe, automatic operation at reasonable cost . . .

. . . You should consider a space saving, all electric, Merrill Process System. Heating mediums can be Oil, Aroclor® or Dowtherm®.

A twist of the wrist puts these systems into operation—and they will hold fluid temperatures to within $\pm 2^\circ\text{F}$. within the range of 200-600°F.

Heat exchangers can be factory mounted and piped when a cooling cycle is required.

Dual systems are available having two completely independent circuits with separate control systems providing heating and/or cooling in sequence, simultaneously, or in any combination in the same unit.

Low watt density finned heating elements protect the heating medium and are readily accessible for routine maintenance. Relief valves, limit switches and positive displacement pumps assure safe, dependable operation. An expansion tank, vented to atmosphere, precludes contact of air with the circulating medium and prevents pressure build-up.

All of the Electric Merrill Process Systems have push button operation from a single control center.

Capacity of available systems ranges from 25,000 Btu/hr. to 500,000 Btu/hr. or up to limits of available power. Heating elements wired for 230-3-60 only in Pilot Plant series to 100,000 Btu/hr., and 230,460, or 550-3-60 in larger units. Control circuit is for 110V 60.



Write for Bulletin 597 giving details of the Pilot Plant Series or send us your requirements.

Parks-Cramer Company
FITCHBURG 12, MASS.

Check 5658 opposite last page

INSTRUMENTS & LAB

can improve results.

Dry-analysis sifting can be improved by increasing falling speed of fine particles by slight suction. Ionization of sifting chamber (by ultra-violet rays or radioactive isotopes) will accelerate discharge sufficiently to allow rapid sifting of fine powders.

Limits of sifting are, of course, determined by screen sizes. Standard mesh is available for sift analyses involving particles from 30 microns to a maximum of 3000 microns.

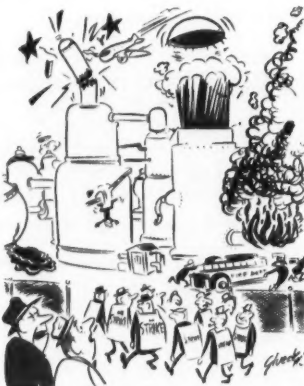
Said to be simple enough that unskilled personnel can operate instrument, sift analyzer can be readily used as a small analytic sieve. Motion supplied by the standard sonic instrument permits separation of material into six particle sizes, using a set of five sieves. Samples as large as 100 grams can be accommodated.

Operating on 220 volts, 60 cycles, at 60 watts, the unit is light enough to be held in the hand.

(Article on process-size sonic equipment is on page 180.)

(Sonic laboratory sift analyzer is available from United Specialties Company, Subsidiary of Industrial Enterprises, Inc., 9705 S. Cottage Grove Avenue, Chicago 28, Illinois.)

Check 5659 opposite last page.



"Ever have one of those days when everything seems to go wrong?"



**SEND FOR
FREE BULLETIN No. 912**

Three models of Cambridge pH Meters, as well as the single and multi-point Recorders are available for a wide variety of Chemical, Industrial and Medical applications. The electrodes designed for use with these high accuracy instruments are described in Bulletin No. 912.

CAMBRIDGE INSTRUMENT CO., INC.

3541 Grand Central Terminal, New York 17, N. Y.
PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

Check 5661 opposite last page

What's A "New Solution"?

It's an article in **CHEMICAL PROCESSING** describing a new way of solving a tough plant operating problem. In each issue you will find specific "case histories" showing how these processing problems were solved. Each article states the operating problem . . . explains the process used and gives details of how problem was solved . . . shows results secured.

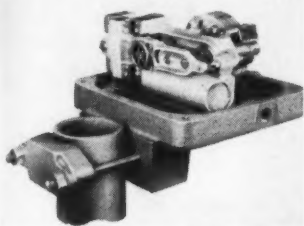
Take a look at "New Solutions" articles in this issue — they might suggest a "solution" for some of your tough processing problems.

**Transmitter mounts
in any position**

Pneumatic force-balance device is easily adjusted

Uses: As temperature and pressure transmitters in pneumatic instrumentation system.

Features: "Balance Beam" design permits mounting of transmitter in any position without positional error.



Temperature and pressure transmitter can be mounted in any position without positional error

Description: Transmitters are pneumatic force-balance devices employing gas-filled thermal systems for temperature measurement and bellows elements for pressure. Unit sub-assembly is used entirely. This permits removal of sub-assemblies without disturbing beam assembly. Thermal systems and pressure elements are readily removed for change of range span. Derivative unit to compensate for lags in thermal system can be added quickly on underside of baseplate, requiring no tubing or fittings. All adjustments are visible and easily accessible. Unit is compensated for ambient temp, barometric press.

(Transmitter is product of Mason-Neilan Division, Worthington Corporation, Nahatan St., Norwood, Mass.)

Check 5663 opposite last page.

Magnetic separators

Design features, special applications, and specifications of manufacturer's rotating field, permanent-magnet separators are described in two-page Bul RFB-101 — Carpc Mfg., Inc., PO Box 3272, Jacksonville 6, Fla.

Check 5664 opposite last page.

NEW!

direct tank-mounted LIQUID LEVEL TRANSMITTER



Exclusive static pressure connection for closed vessels above or below atmosphere . . . eliminates need for second instrument.

This sensing diaphragm capsule flange-mounts directly on side of tank. All wetted parts of Type 316 stainless steel, with optional plastic coating for further corrosion protection.

with DIRECT
3-15 psi
air output signal

IDEAL FOR: Viscous or corrosive fluids, slurries, and solids-in-suspension, as well as "easy-to-measure" fluids.

Now you can measure the level of "difficult" or easy-to-measure fluids — economically, without the complication of floats or bubble tubes, and with sustained high accuracy over the entire range span.

Flange-mounted directly to the side of an open or closed tank, the Type 13FA Transmitter eliminates piping and purging. Its stainless steel diaphragm capsule senses level changes instantly. Conventional tubing leads its output air signal directly to standard 3-15 psi receiver-recorders and controllers without need for intermediate signal converters.

The 13FA provides an accurate, trouble-free solution for level measurement problems. Write for detailed information, or ask your nearby Foxboro Field Engineer to explain its application to your specific process. The Foxboro Company, 816 Neponset Ave., Foxboro, Mass., U.S.A.

FOXBORO

REG. U.S. PAT. OFF.

LIQUID LEVEL TRANSMITTERS

Check 5665 opposite last page

So **SIMPLE** that
"Specials" are
Likely to be
Standard!



A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol

MAGNETROL

The World's Most Dependable LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . with multi-stage switching when desired. Send coupon for full details.

MAGNETROL, Inc.

Send Coupon
For Full Details

MAGNETROL, Inc. 2129 S. Marshall Blvd., Chicago 23, Ill.
Please send me catalog data and full information on
Magnetrol Liquid Level Controls.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

Check 5666 opposite last page

INSTRUMENTS & LAB

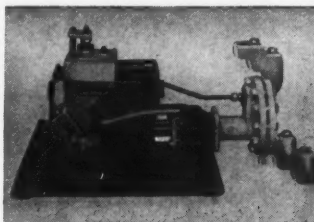
Teflon diaphragm prevents leaks

Chemical metering pump is
corrosion-protected

Uses: Metering toxic, obnoxious, corrosive, or costly chemicals.

Features: Chemical metering pump has Teflon diaphragm sealing liquid ends from plunger and housing.

Description: Pumps retain manufacturer's Step-Valve



Teflon diaphragm protects pump

liquid end, as well as other features of standard pumps with which it is interchangeable. Accurate to \pm one percent, they are positive-displacement metering pumps. Displaced hydraulic fluid strokes diaphragm to impart pumping action through double ball checks.

With maximum capacities from 1.1 to 138 gph and pressures to 2000 psi, pumps are adjustable from zero to 100% capacity.

(Teflon-diaphragm pumps are product of Milton Roy Company, 1300 E. Mermaid Lane, Philadelphia 18, Pa.)

Check 5667 opposite last page.

Compact pitot tube aids cut-and-try tests

Needs only small opening that is easily closed

Uses: Particularly useful in experimental engineering — for cut-and-try design work where number of measurements must be made before system design is final. Small openings required are easy to close.

Features: Compact pitot tube, flow-meter primary ele-

125 TON P.H.I.

WITH
THESE
ELECTRIC
FEATURES



- Hydraulic System
- Cycle Timer
- Temperature Controlled Platens
- 24" x 24" Platens to 600°
- Two position ram gives variable daylight.

Write for circular



PASADENA HYDRAULICS INC.

1430 Lidcombe, El Monte, Calif.

Check 5668 opposite last page

TANK-METER

FOR MEASURING TANK CONTENTS
ANY DISTANCE AWAY

TANKS MAY BE...

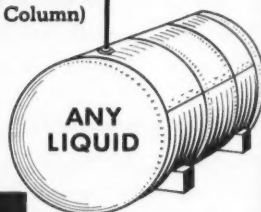
- BURIED OR ELEVATED
- OPEN • CLOSED • VENTED
- UNDER PRESSURE • UNDER VACUUM
- UNDER PRESSURE AND VACUUM
- ACCURATE • RELIABLE • DURABLE

Also gauges for:

Barometric Pressure (Mercury Column)
Absolute Pressure (Mercury Column)

Pressure and Vacuum
Differential Pressure
Inclined Manometers
for draft, pressure or
differential pressure.

SEND FOR BULLETINS



Uehling
INSTRUMENT CO.

488 GETTY AVE.
PATERSON, N. J.

SINCE 1896

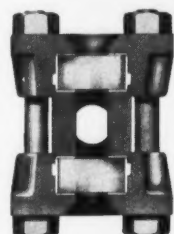
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CHEMICAL PROCESSING

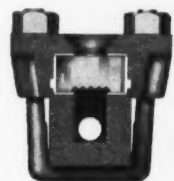
Strahman

HIGH PRESSURE GAUGES

USED IN
REFINERIES
AND
CHEMICAL PLANTS
THROUGHOUT
THE WORLD



THRU VISION



REFLEX

Single or Multiple
Sections

TUBULAR

Gauge Cocks
Large Chamber
Reflex Gauges
Heated or Cooled
Gauges

SEND FOR
COMPLETE
CATALOGUE

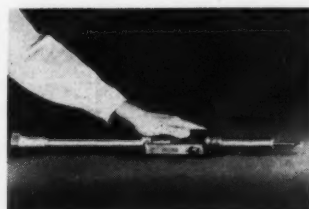
STRAHMAN VALVES, Inc.
16 Hudson St., New York 13, U.S.A.

INSTRUMENTS & LAB

ment, is designed so that impact opening always faces exactly upstream for maximum accuracy.

Description: Instrument is available in stainless steel, brass, bronze, or Monel. Unit has safety lock to permit pitot tube to be secured in any position, even when running a traverse.

In use, two tubes are fas-



Compact pitot tube needs only a small opening for insertion into pipe

tened together. When inserted into flowline, one tube presents opening for velocity head and other receives static head. Difference between pressures is proportional to square root of flowrate in line. A differential pressure instrument can be connected to measure this quantity and indicate flowrate on a scale graduated in flow units.

(C-Mar pitot tube is product of C-Mar Corporation, Manasquan, New Jersey.)

Check 5671 opposite last page.



"Well, I always judge a man by the company he owns."

THE MARK OF QUALITY



Wheelco
Instruments

**Don't settle for less...
get the best
control system
for your processing**



There's no need to settle for inferior performance or pay a premium for features your processing doesn't require. Wheelco Series 400 Capacitrols, available in six standard control forms, let you choose the indicating controller ideally suited to your processing needs. Get the facts on their proved performance on a variety of installations requiring indicating and controlling of temperatures, voltages, current, speed, and similar variables.

Controls forms you can choose include: two-position, time-proportioning, multi-position, proportional-position, and "stepless" electric proportioning. All of them give you electronic "no drift" control and "plug-in" design for easy maintenance and service.

Ask your nearby Wheelco field engineer for Bulletin F-6314.

BARBER-COLMAN COMPANY

Dept. F, 1520 Rock Street, Rockford, Illinois, U.S.A.

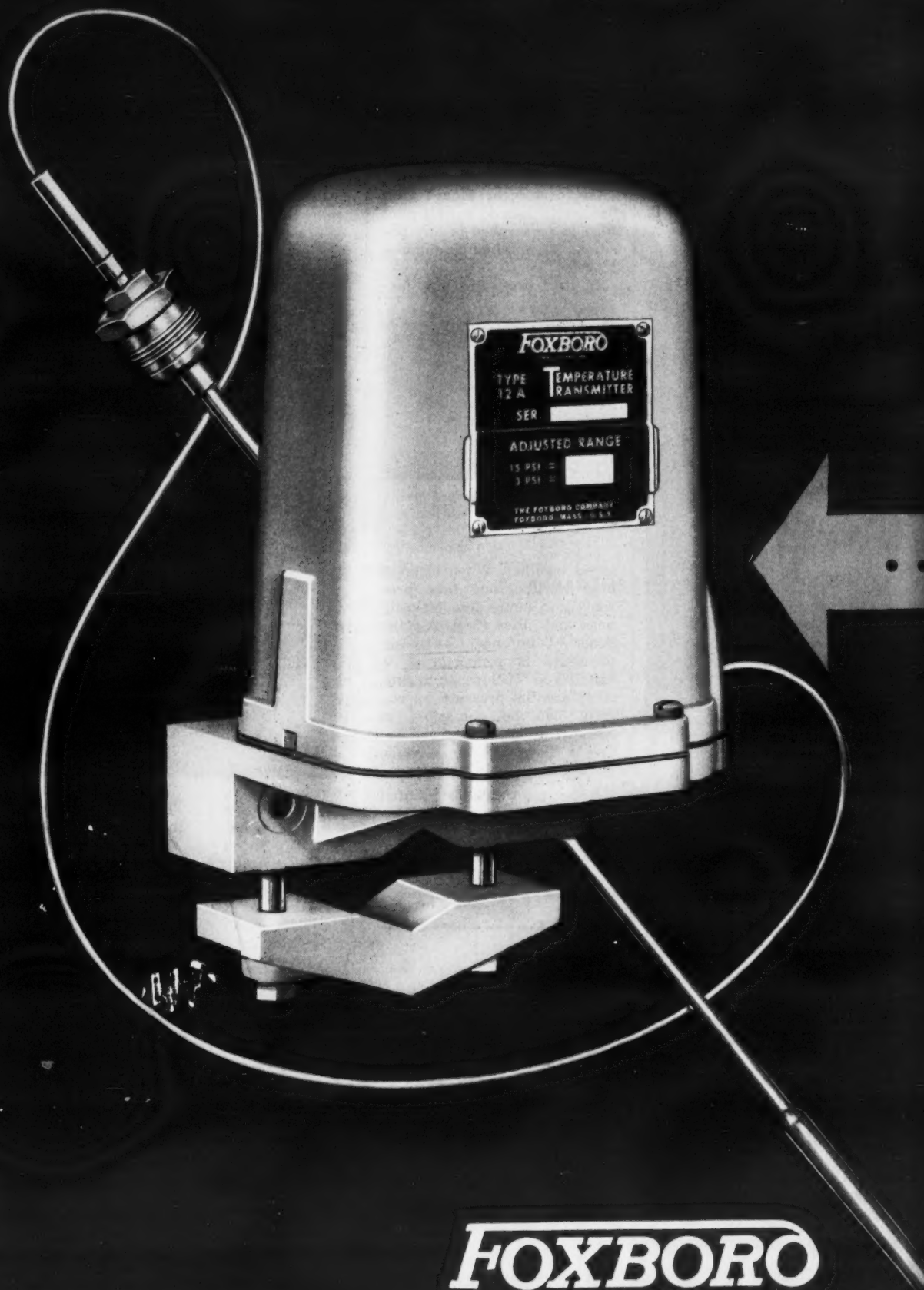
BARBER-COLMAN of CANADA, Ltd., Dept. D, Toronto and Montreal, Canada

Industrial Instruments • Automatic Controls • Air Distribution Products
Aircraft Controls • Small Motors • Overdoors and Operators • Molded
Products • Metal Cutting Tools • Machine Tools • Textile Machinery

Check 5670 opposite last page

JUNE 1958

Check 5672 opposite last page



FOXBORO
REG. U. S. PAT. OFF.

Type 12A pneumatic

Temperature Transmitter Improves Remote Control

• fast — sensitive — rugged!

There is no easier, simpler way to measure remote temperatures, over so wide a range, with such high sustained accuracy and speed, and at so low a cost!

The Type 12A Temperature Transmitter converts temperature measurement to a linear air output signal, which is transmitted to any standard 3-15 psi recorder or controller. Measuring spans of 50, 100, 200, 300, or 400 degrees F. are available, set as required within the over-all transmitter range of -100°F . (lower when necessary) to $+1000^{\circ}\text{F}$. Fully compensated for ambient temperatures and pressure, this rugged, highly responsive instrument performs outstandingly under the most severe conditions. And it's insensitive to mechanical vibration.

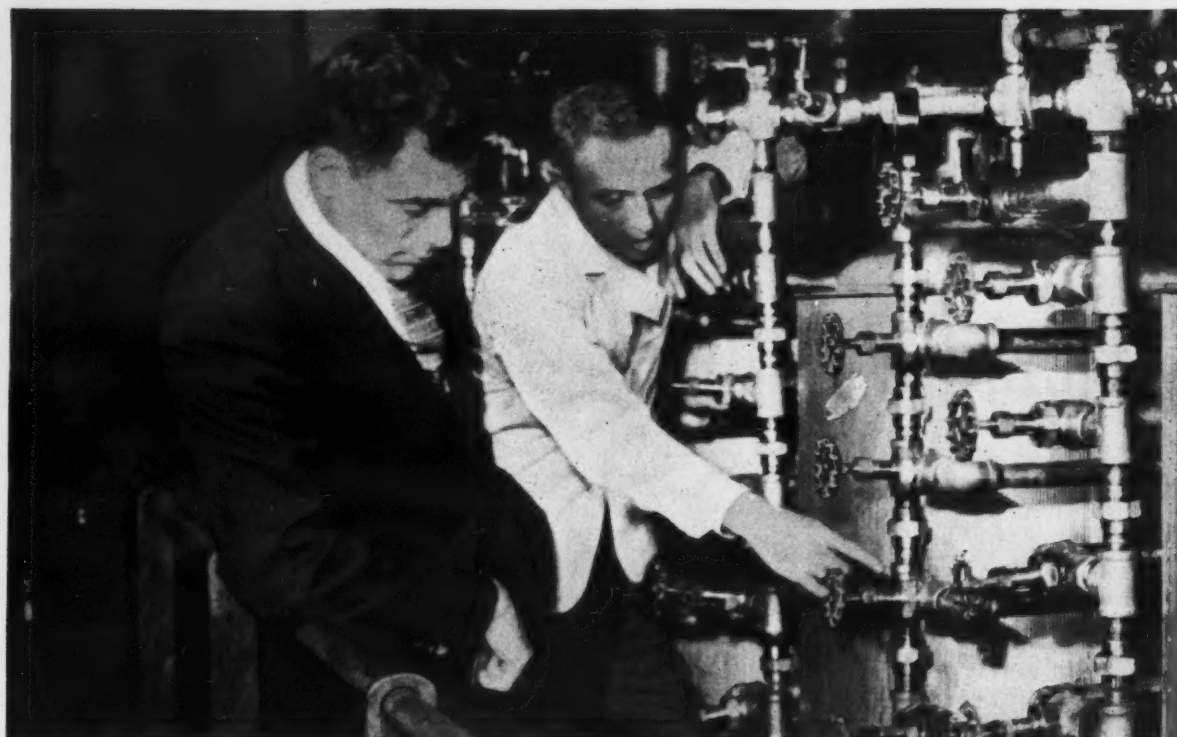
The transmitter weighs only 7 pounds with its integral mounting bracket. It can be mounted anywhere . . . in any position . . . even directly on a bulb well! The gasketed, weatherproof housing permits installation in any hazardous, corrosive, or outdoor location. Transmission line is conventional air tubing — no troublesome conduit, no costly capillary to run.

Derivative action is furnished for optimum performance when process or transmission lags exist.

Write for Bulletin 13-17. It explains fully why the Foxboro Type 12A Temperature Transmitter gives better performance with lower installation and maintenance cost. The Foxboro Company, 816 Norfolk St., Foxboro, Mass., U.S.A.

• • Pneumatic Temperature Transmission

Check 5673 opposite last page



Joseph Smindak (right), Plant Engineer, Coffee Instants, Inc., Flushing, N.Y. Left, Michael De Piano, N.Y. representative, Cooper Alloy Corp. Foreground, Cooper Alloy 1" stainless Union Bonnet Globe Valves.

SMINDAK of COFFEE INSTANTS, INC.

Tells why he specifies Cooper Alloy for stainless steel valves and fittings

Q. Mr. Smindak, why does Coffee Instants, one of the nation's leading instant coffee processors, use stainless valves and fittings in processing their product?

A. To protect product purity, a must with us as with most other food processors. Contact with other metals can degrade flavor and aroma; stainless steel does not.

Q. Why Cooper Alloy?

A. Because of the special Cooper Alloy construction features I find combined in no other brand. On these Cooper Alloy union bonnet globe valves, for example,

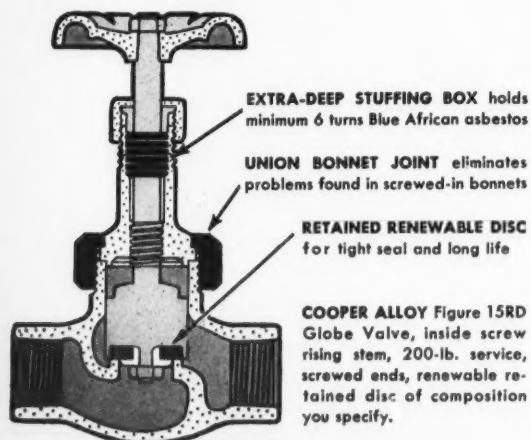
we like the ease of operation and the low maintenance; the fact that it removes a threaded joint from product contact; and in particular, the extra-deep square-compression stuffing box which reduces maintenance, gives a tighter seal at stem. Then too, the excellent service we get from Cooper Alloy sales people and distributors.

Q. You don't find these features in any competing valve?

A. Frankly, not one has them all. That's why, for our stainless valves and fittings, we insist on Cooper Alloy.

YEARS AHEAD IN DESIGN SUPERIORITY! No matter what your valve type—globes, gates, angles, checks, or Y's—the Cooper Alloy model's outstanding design features will be important to you. Cooper Alloy, with 35 years of pioneering experience in stainless steel, does not merely adapt existing brass and iron valve patterns; it creates valves designed to be cast in stainless! Check the special design features of valve shown at left.

As the little CA man below is saying: "You Can Tell A Cooper Alloy Valve As Far As You Can See It!" Write today for your copy of our folder "Design Factors In Stainless Steel Valves." The Cooper Alloy distributor near you will be glad to show you the complete line of Cooper Alloy valves and fittings, and their advantages. He can serve you promptly from local stocks.



COOPER & ALLOY

Corporation • Hillside, New Jersey
VALVE & FITTING DIVISION

THIRTY-FIVE YEARS OF STAINLESS STEEL PIONEERING

Check 5674 opposite last page

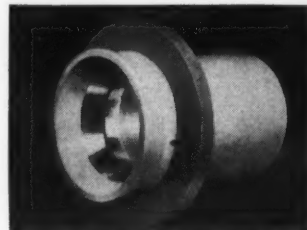
INSTRUMENTS & LAB

Plastic flow meter tube is suitable for use on corrosives

Has low head loss and reduced pumping cost

Uses: As flow metering device for acids, alkalis, and slurries, including many corrosive materials.

Features: Differential flow tube is made of epoxy or polyester resins, reinforced with glass fiber.



Plastic metering tube can be used on corrosive fluids

Description: Instrument fits between pipe flanges. Its extremely short length and light weight make it easy to install. Accuracy is within $\pm 1\%$ of actual flow rate for uncalibrated unit. This accuracy can be increased to $\pm \frac{1}{2}\%$ by laboratory calibration. Flow tube is said to have very low head loss, with consequent reduced pumping costs. Standard models are available with variety of metallic materials for pH from 0.2 to 10. Temperature ranges are -60° to 220°F .

(Plastic Dall Flow Tube is product of Builders-Providence, Inc., Div. of B-I-F Industries, Inc., 345 Harris Ave., Providence 1, R. I.)

Check 5675 opposite last page.

Lab glassware catalog

Color-coded glassware catalog of 350 pages contains complete listing of manufacturer's borosilicate glass chemical ware and apparatus. A two-page chart shows properties, principal uses, and forms available for 32 different glass compositions. Cat LG-1 may be obtained on letterhead request from Corning Glass Works, Corning, N. Y.



cp CORROSION
CONTROL

Uranium Reduction Co. plant
during construction phase

Purification of uranium is a painstaking, tricky process involving the handling of large quantities of aggressive solutions that could destroy equipment rapidly. More than 1½ years of successful operation with a minimum of maintenance shows that —

RUBBER-LINED and NEOPRENE-LINED Tanks Resist Corrosive Acid Solutions

GORDON WEYERMULLER
Associate Editor

With **LEW PAINTER**, Mill Superintendent
Uranium Reduction Co., Moab, Utah

One of the largest installations of rubber-lined and neoprene-lined tanks in the country is giving excellent service in handling the corrosive leaching and ion exchange solutions used in purification of uranium. Tanks used at Uranium Reduction Co. are still in excellent condition in spite of more than 1½ years of continuous use handling solutions containing sulfuric or nitric acid.

Uranium purification process involves large volumes of acidic solutions. When the ore first arrives at the reduction plant, it is milled through a series of powerful crushers. Next it goes to 10 neoprene-lined steel leach tanks. Leaching involves addition of 66° Baumé sulfuric acid to a 50% solids mixture of ore and water.

Each tank is 24' in diameter and 12' high. During installation, interior of each tank was sandblasted and the 3/16" neoprene lining was applied. Each tank has a brick bottom, with brick ex-

tending 2' up the sides, and is equipped with three 30-hp agitators. Steel framework over leach tanks gives ready access of crane to agitators.

After desanding, leached pulp passes through the RIP (resin-in-pulp) section. Here the pulp contacts the resin held in 6x6x6'

stainless wire mesh baskets, which are jiggered in a series of 14 tanks for extraction of uranium by ion exchange.

In the ion exchange process, screen baskets holding the resins are jiggered in the pregnant slime pulp flowing through the RIP tanks, each of which has four

baskets. Feed pulp is 7% solids of minus 325 mesh and has a pH of 1.6 ± 0.1 . Resin used is Amberlite XE-123, a strong base quaternary amine anion exchange type especially suited for the RIP process. Eluting ion used is the nitrate furnished by nitric acid.

Interior of RIP storage and holding tanks was sandblasted and then lined with natural rubber. Ten of the tanks were lined with 3/16" soft rubber, and four with 3/16" hard rubber. All of these tanks are 22' in diameter and 12' high.

In next step, uranium is stripped from resin beads. Solution is then neutralized with ammonia to precipitate the yellow finished product, called yellow cake. After drying, it is ready for shipment to the AEC.

(Tanks were lined with neoprene or natural rubber by Goodall Rubber Company, Trenton 4, New Jersey.)

Check 5676 opposite last page.

(Steel tanks were furnished by Hammond Iron Works, Provo, Utah.)

Check 5677 opposite last page.



Steel framework over neoprene-lined leach tanks gives crane ready access to agitators

TEFLON BELLOWS

LARGE

OR SMALL.....

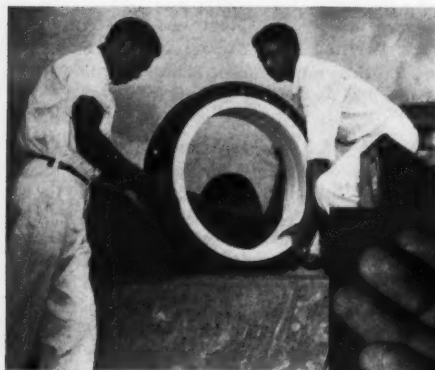
DORÉ HAS THEM ALL

Bellows, Expansion Joints, Flexible Couplings of Teflon in any size are available from Dore'.

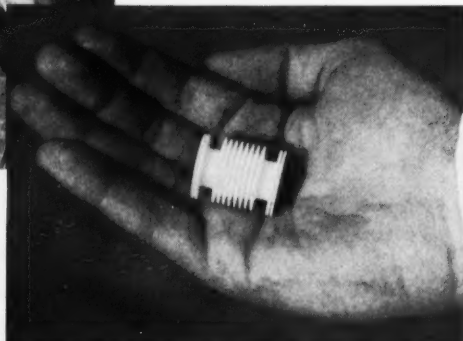
Dore' bellows are superior because:

1. Pressure, temperature and movement charts are furnished with every Dore' bellows of Teflon. These movement charts show that Dore' bellows can be flexed through the recommended movement cycle without damage to fragile, corrosion resistant flanges and pipes.
2. Every Dore' bellows, expansion joint, flexible coupling is tested under full expansion and contraction at pressures 50% greater than rated safe working pressures prior to shipment.
3. Split ductile iron flanges eliminate fatigue and weak spots where the bellows neck joins the sealing face. This type flange assures close tolerance between the bellows and the flange.
4. Integral square cut envelope gasket flanges are smooth for perfect sealing at bolt pressures considerably less than pressures required to seal solid Teflon gaskets.
5. Dore' engineering knowhow, especially designed machinery and skilled technicians are your guarantee of the finest in Teflon.

For maximum flex life and corrosion resistance, specify Dore' white Virgin unfilled Teflon bellows.



Twenty-four inch Teflon Flexible Coupling leaving the Dore' plant.



This tiny 3/8" Teflon Bellows is another example of Dore' versatility in molding Teflon shapes.

John L. Dore' Co.

5406 Schuler • P. O. Box 7772 • Houston 7, Texas
Export: 1505 Race St. • Philadelphia 2, Pa., U.S.A.
Cable Address: DOREX

SALES ENGINEERS
FOR JOHN L. DORE, INC.

DU PONT'S TEFLON
HI-QUALITY NYLON

CORROSION CONTROL

Tests of rigid PVC pipe show good resistance to 98% sulfuric

Specially formulated PVC contains no adulterants

Uses: In manufacture of rigid polyvinyl chloride pipe, pipe fittings, calendered sheet stock, other molded and extruded shapes.

Features: Compound is said to be more chemically resistant than competitive materials because it contains no adulterants helpful in processing, but which adversely affect chemical-resistance of the base polymer.

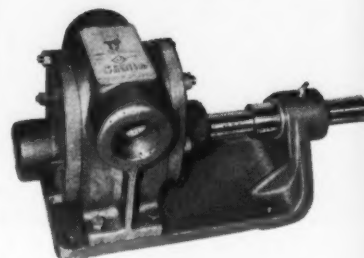
Description: Compound is a Type I or "high chemical-resistance" unplasticized PVC. In course of a test, rigid PVC pipe fabricated of this polymer was filled with 98% sulfuric acid. After 67 days and three refills with fresh acid, "weeping" was observed of certain sections in the form of tiny droplets of acid appearing on the outside of the pipe. Sections made of manufacturer's



"For his 30 years of distinguished service, during which he built a name which will long be remembered in the field of chemical research, I take great pleasure in presenting this token of our esteem to Doctor Whats-his-name here."

GAULIN

Twin-Lobe* P.D. Pumps Provide High Efficiency on Wide Range of Products



Manton-Gaulin presents a completely new concept in rotary positive displacement pumping — The Gaulin Twin-Lobe* design.

Unusual simplicity and extremely efficient performance are the results of a special "Twin-Lobe" pumping principle. These are the advantages:

- Simple construction, only three moving parts.
- High mechanical efficiency, lower horsepower required.
- High vacuum, self-priming. Efficient enough to move volatile gases or extremely viscous liquids.
- Wide range of uses and built-in corrosion resistance.
- Special materials used throughout for long wear, precision fit.

One Basic Design Good for Many Uses



Highly efficient Twin-Lobe design for transfer and metering of liquids, heavy slurries, pastes, soft food solids, gases, and light non-lubricating liquids.

Capacity and Pressure Range

Three models now available. Capacities: 0-56 gpm; Pressures: 0-200 psi.

Send for New Bulletin!

Find out how the new Twin-Lobe pump can save money, improve efficiency of transfer and metering.

*Pat. Pending



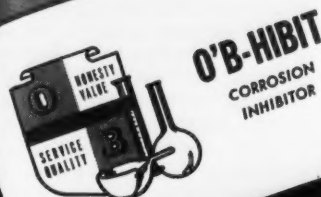
55 Garden Street, Everett 49, Mass.

World's largest manufacturer of stainless steel reciprocating, positive displacement, pressure exchange pumps, dispersers, homogenizers and colloid mills.

Check 5678 opposite last page

Check 5679 opposite last page

CHEMICAL PROCESSING



If you formulate
ACID CLEANERS
you can use
this label . . .

The manufacturer of an
ACID CLEANER who dis-
plays this label on his
product indicates he is
using the finest Corrosion
Inhibitor available.

For complete information
on O'B-HIBIT and the dis-
tributors in your area,
write:



O'B-HIBIT
P. O. Box 72
Coldwell, N. J.

Gentlemen:

Please send complete information
on O'B-HIBIT Corrosion Inhibitor.

Name

Address

CORROSION CONTROL

compound showed no effects.

Further tests with other compounds has led manufacturer to suggest that use of the material with following compounds would be practical: 80% acetic acid, concentrated sulfuric acid, 60% nitric acid, 85% phosphoric, 30% hydrochloric acid, 40% chromic acid, saturated oxalic acid, 50% sodium hydroxide, ethyl alcohol, glycerine. Tests were made as to resistance of the compound to these materials over a period of 30 days at 140°F.

Physical properties of compound are: specific gravity 1.40, tensile strength (psi) 7200, tensile elastic modulus (psi) 400,000, hardness (Duro-meter D) 82.

(Compound R4 PVC is product of Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.)

Check 5681 opposite last page.

Standard 100' coils of tube of natural polyethylene off-the-shelf item

Measuring 1" OD by .814 ID, standard 100' coils of natural polyethylene tube are available from manufacturer as off-the-shelf item. Tube is designed for transmitting liquids in beverage dispensing equipment; for acid handling in laboratory and production operations; and for other corrosive media.

(Polyethylene tube is available from American Agile Corporation, PO Box 168, Bedford, Ohio.)

Check 5682 opposite last page.

Protective coatings

Featuring actual color chips of 102 different coatings, 36-page manual includes complete sections devoted to methods of surface preparation, use of primers, finish coatings, and availability of special custom coatings where required. Form 257 — Rust-Oleum Corporation, 2799 Oakton St., Evanston, Ill.

Check 5683 opposite last page.

Life in these excited states...

"We've been having
trouble with corrosion
in this section."



Corrosion is embarrassing

It's expensive, too. Not only in terms of equipment chewed up, but also in un-timely time losses and wasted ingredients. You save embarrassment and expense *both* with Ace chemical resistant piping, valves, pumps, tanks, and special lined equipment. 108 years' experience at your service.

All-purpose rigid PVC. Sched. 40, 80 & 120, ½ to 4". Threaded or socket-weld fittings. Valves ½ to 2", NSF-approved. Bul. CE-56.

RIVICLOR
(for ageless strength)



Improved design... now 12 gpm. All wetted parts acid-resistant, wear-resistant Ace hard rubber. Finest available. Bul. CE-55.

NEW
ACE Gear Pump



Flexible poly pipe, ideal for water lines, drains, underground pipe or conduit. Sizes ½ to 2", long coils, NSF-approved for drinking water. Bul. CE-57.

SUPPLEX
tops in economy



World's best chemical valves... at moderate prices. All-plastic, rubber-lined, or all-hard-rubber. ¼" pet cocks to 24" gate valves.

VALVE
HEADQUARTERS



ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
Ace Road • Butler, New Jersey

ACE

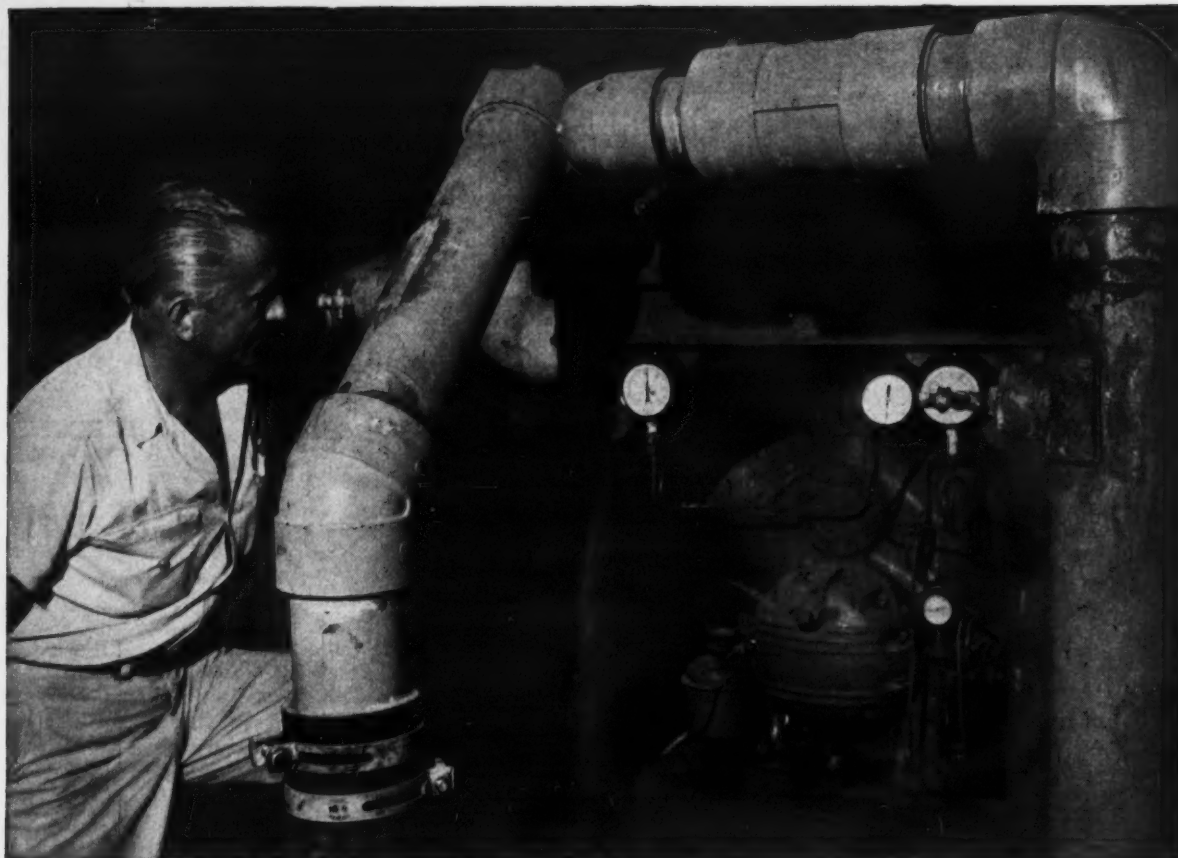
See our pages
in
cee
Catalog!

Check 5680 opposite last page

Check 5684 opposite last page

News about

B.F. Goodrich Chemical *raw materials*



the pipe is made of Geon
handles salt water under pressure: *no corrosion*

NO pipe replacement problem will plague the owners of this Florida air conditioning installation. If ordinary pipe had been used, the corrosive effect of salt water under pressure would soon show up in high replacement costs. But pipe made from Geon rigid vinyl handles the job easily—and permanently. It is not affected by salt water. No galvanic corrosion problem either.

Geon vinyl pipe more than pays its

way wherever corrosion is the problem. Installation crews like it, too, because it is lightweight and easy to handle. Can be readily joined by solvent welding.

How can you take advantage of pipe made from Geon rigid vinyl? Get information by writing Dept. LJ-6, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



B.F. Goodrich Chemical Company
a division of The B.F. Goodrich Company



GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

Check 5685 opposite last page

CORROSION CONTROL

Transparent vinyl plate has good resistance, physical toughness

For applications demanding both corrosion resistance and light transmission, a transparent vinyl plate has been developed that offers wide-range chemical resistance and has tough physical characteristics. Expected to prove particularly useful in the manufacture of such equipment as laboratory hoods and small plating tanks, the plate is available in two tints: Type F-51 is a clear yellow and Type F-63 is an emerald green.

(Transparent PVC plate is available from Kaykor Industries, Division of Kaye-Tex Mfg. Corp., Yardville, N.J.)

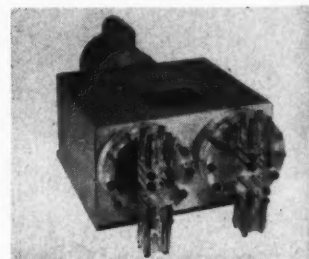
Check 5686 opposite last page.

Pump's barrier diaphragm isolates working parts from fluid handled

Unit has smooth, balanced piston action

Uses: For handling corrosive fluids.

Features: Pump has barrier diaphragm separating all working parts from fluid handled. Actuating fluid between piston and diaphragm is employed to do pumping. There



Pump for handling corrosives features barrier diaphragm separating all working parts from fluid handled

is no mechanical linkage of any kind to cause excessive maintenance or failure. Smooth, hydraulically balanced piston action with equal pressure on either side of diaphragm barrier results. All surfaces of

CORROSION CONTROL

pump which contact corrosive media are of solid fluorocarbons.

Description: Diaphragm-type pump, which is essentially a piston type, is available in both simplex and duplex models. Pumps feature suction lifts to 20 feet, with standard design pressures of 50 psi. Higher pressures are available for special applications.

Materials other than fluorocarbons which may be used for head and valves are: all types of stainless, Hastelloys, rigid PVC, Uscolite, and titanium. For diaphragms, Kel-F elastomer, Hypalon, Hycar, and neoprene may be used.

(Kemlon pump is product of The Keystone Engineering Company, PO Box 14366, Houston 21, Texas.)

Check 5687 opposite last page.

Oxidizing agents can't harm coatings

Heavy-duty material applied by any maintenance crew

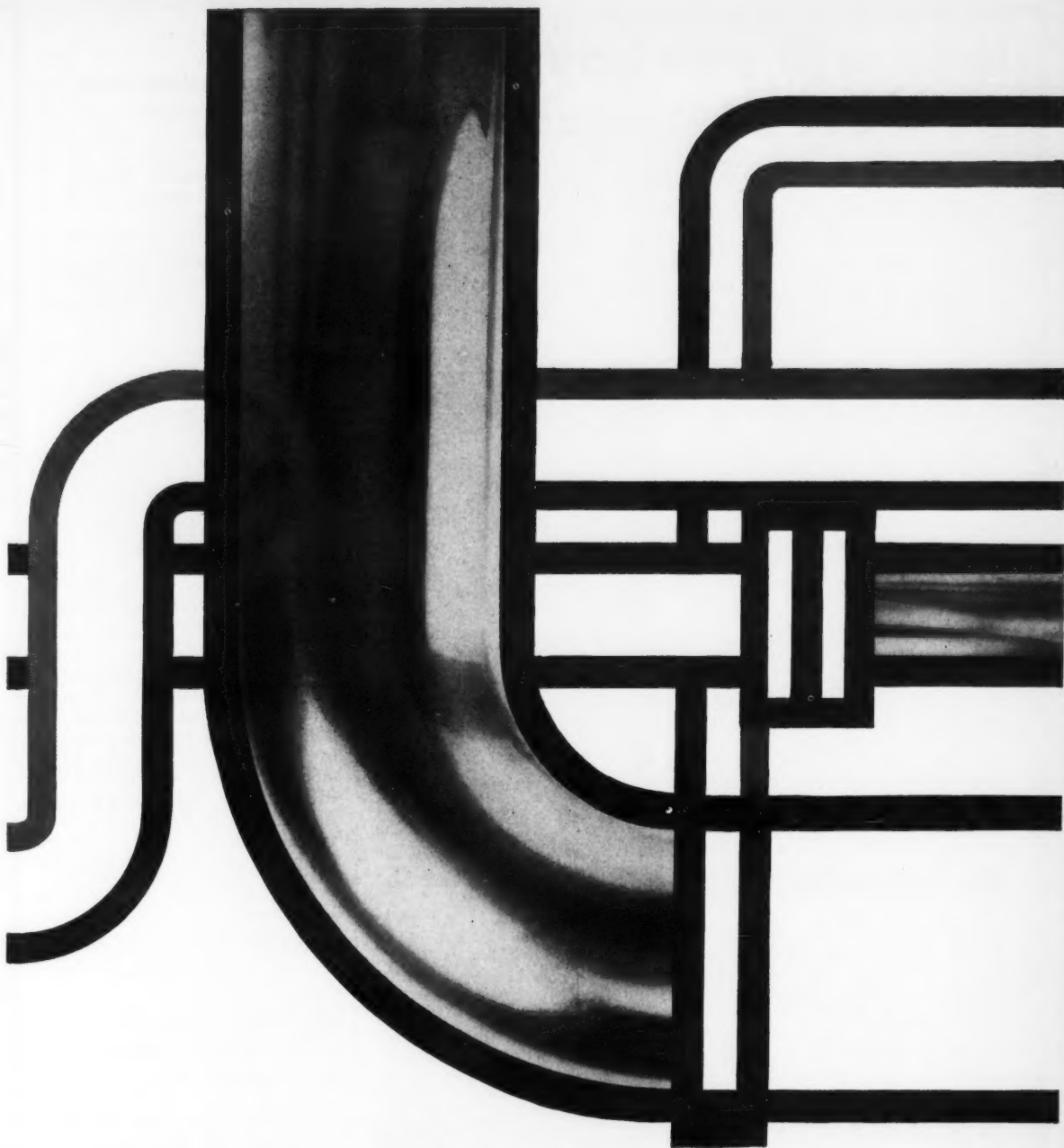
Uses: For protection of steel tanks, pumps, compressors, ducts, fans, water condensers, piping, and refinery structures. Also recommended as a tank car lining.

Features: Coatings are extremely resistant to severe oxidizing agents over wide temperature range.

Description: Series of thick, heavy-duty chemical-resistant linings are high solids materials formulated with chlorosulfonated polyethylene polymers (Hypalon). They are supplied exclusive of primer in two basic formulations. A one-part packaged material is recommended for fumes and spillage, of moderate duration and concentration. A two-package system, consisting of base and curing agents is recommended for fumes, spillage, and immersion service under severe conditions.

(Corethylene No. 100 Series coatings are product of Corrosion Control Co., Inc., 516 Fifth Ave., New York 36, N.Y.)

Check 5688 opposite last page.



win the fight against corrosion—with Alcoa Aluminum

For over 30 years, Alcoa development engineers have successfully employed the outstanding corrosion resistance of aluminum to solve corrosion problems in the process industries. Their unparalleled knowledge of aluminum's behavior in corrosive situations can furnish proved solutions to your most serious corrosion problems. Let Alcoa show you how to win the fight against corrosion—with Alcoa® Aluminum. You'll

get these extra benefits, too: Light weight • Good workability • Low cost • High thermal and electrical conductivity • Great strength in alloys • Non-sparking characteristics • Non-toxicity • Good reflectivity • Clean, attractive appearance.

For immediate help, outline your corrosion problems in a letter to ALUMINUM COMPANY OF AMERICA, 902-F Alcoa Building, Pittsburgh 19, Pennsylvania.


"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings



Specify Alcoa Aluminum for
corrosion-free Process Equipment
Pipe & Tube
Tanks, Containers, Trucks & Cars
Plant Structures

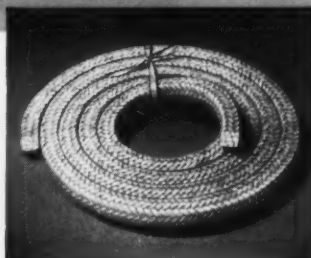
Check 5689 opposite last page

How will you have your TEFLON packing

BELMONT TEFLON* Packings—impervious to acids, caustics, oxidants, solvents, for long troublefree life in the most difficult service—are offered in a wide variety of forms to best suit each individual requirement. Select your needs from the *most complete line* and get *exactly* what you want. Your Belmont Packing Distributor is ready to serve you. Or write for Catalog T-57.

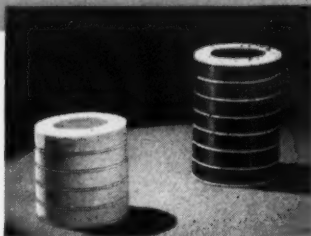
BRAIDED

Belmont braided Teflon yarn (No. 3085) and Teflon ribbon (No. 3055) are offered with the rugged mechanical structure of Belmont's unique **CRISS-CROSS Braid** that will not ravel, wear through, slough off. Each strand criss-crosses diagonally through the body of the packing, becoming an integral part of the whole. Supplied in coil, reel and ring form.



MOLDED

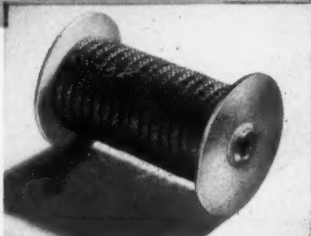
Belmont Pump Packing Rings, molded from shredded pure Teflon with Teflon suspensoid (No. 3062) and impregnated with graphite (No. 3061) serve the requirements for both non-contaminating and general purpose chemical pump service throughout the processing industries. Supplied in sets with solid Teflon spacers.



EXTRUDED

Belmont Extruded Teflon Packing (No. 3060-C) is shredded pure Teflon, impregnated with graphite and reinforced with a skeleton jacket of Teflon yarn. Available in reels and continuous lengths.

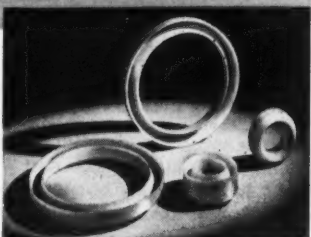
Belmont Bulk Packing (No. 3060-B) is shredded pure Teflon with graphite. Available in ½, 1 and 5-lb cans.



SOLID Rings

Belmont Solid Teflon Packings are offered in 3 designs—V-Rings (No. 3105), cup and cone (No. 3115) and wedge type (No. 3115-X). All provide a tight seal at low gland pressure and minimum friction on valve stem. Offered in sets, with square end adaptors where required.

*du Pont Trademark



The Belmont Packing and Rubber Company • Butler & Sepviva Sts., Phila. 37, Pa.

BELMONT

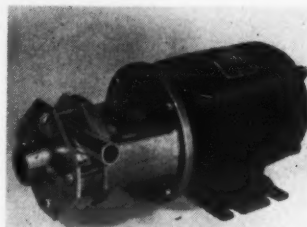
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CORROSION CONTROL

Low-cost centrifugal pump has efficiency rating of 80 percent

Uses: For pumping water or thin slurries to capacity of 12 gal per minute.

Features: Unit is claimed to have 80% efficiency rating. It is fabricated entirely of stainless steel, and has Teflon-asbestos seal.



Low-cost stainless steel centrifugal pump is rated at 80% efficiency

Description: Centrifugal pump will generate 55 lb of pressure at shut-off. Weighing only 5¼ lb, pump is driven by 1/7-hp motor. It may be mounted in any position, and the outlet may be rotated 360°. Overall size of pump and motor is 8x4x3½".

(Model 0-10 centrifugal pump is product of Oscar Fisher Co., Inc., Newburgh, N.Y.)

Check 5691 opposite last page.

Pipe, tanks protected from hydrogen sulfide by catalyzed epoxy

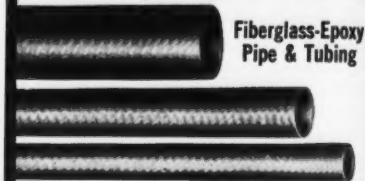
Coating system effective for storage tank vapor areas

Pipe and tanks carrying sour crude oil have been protected against corrosion for three years by a catalyzed epoxy coating system. The coating has proven especially effective for vapor areas of storage tanks.

The vapor area, the underside of the deck and about 18" down the sides, is constantly under severe attack from sour gases. These gases contain various parts of H₂S, ordinarily very corrosive. This is a must area to protect on tanks because corrosion from decks

From Arsenic Trioxide, As₂O₃
To Zinc Chloride, ZnCl₂

FIGHT CORROSION with TUFF-TUBE



TUFF-TUBE is the most effective plastic material available to fight corrosion in the chemical, petrochemical, and food processing industries.

Resists thousands of highly corrosive chemicals (acid & alkali), solvents, gases, compounds.

Excellent thermal and electrical insulation. Eliminates problem of electrolysis.

Withstands temperatures up to 400°F and extreme thermal shocks.

Non-magnetic and non-sparking

Requires no maintenance after installation

One-sixth the weight of steel, easily handled on the site.

Smooth inner walls and concentricity insure unobstructed, fast moving flow.

Standard lengths to 10 ft. Tubing diameters down to 1/16 in. Pipe sizes up to 4 in. Wide range of wall thicknesses.

A really tough material—will not weather, rot, or age under severest environmental conditions.

For a one-foot length of laboratory tubing or a one-mile underground pipe, TUFF-TUBE is available for your process operation. And you can expect real savings in three ways—original purchase, easy installation, minimum maintenance.



LAMTEX
INDUSTRIES, INC.

51 STATE STREET • WESTBURY, NEW YORK

Check 5692 opposite last page

CHEMICAL PROCESSING

CORROSION CONTROL

causes about 75% of the corrosion on tank bottoms. The H_2S scale forming on the decks falls to the bottom, and when it combines with the water there, corrosive action begins immediately. Consequently, the best way to protect a tank bottom is to control deck corrosion.

Before coating is applied, all areas are sandblasted to remove foreign matter. The coating is then applied in various colors (to insure complete coverage) until a minimum of six mils of film thickness is obtained.

After three years of severe corrosive attack, the catalyzed epoxy coating is still effectively protecting pipe and tanks from sour crude oil after effects, and retains a glass-like surface.

(Nu-Pon Cote Type III was applied by A. J. Hunt Contracting Company, Incorporated, 1904 North Grant, Odessa, Texas.)

(Nu-Pon Cote Type III is product of The Glidden Company, 900 Union Commerce Building, Cleveland 14, Ohio.)

Check 5694 opposite last page.

Perfect liquid distribution is claimed by use of equalizer

Liquid reservoir provided to act as damper

Uses: For impervious graphite, falling film-type absorbers.

Features: Distributor head is claimed to provide virtually perfect liquid distribution to tubes. By use of an "Equalizer" principle, liquid reservoir is provided to act as a damper on any surges of entering liquid, and to force all the liquid to reach the exact same level at the same time.

Description: Corrosion-resistant, impervious graphite, liquid distributor head is produced as a separate unit from the tube section of the absorber. It can be converted to a standard heat exchanger by merely substituting the desired exchanger head.

Uniformity of liquid distri-

JENKINS

MADE BETTER
THAN
NEED
BE . . .

Costs Less to Use

YOU PAY NO MORE for the extra quality you see in every part of a Jenkins Outside Screw & Yoke U-Bolt Gate valve. Yet longer life and reduced maintenance is bound to result from the extra ruggedness, the precision manufacture and unique design features which Jenkins puts into these popular, general utility valves.

Choose the Outside Screw & Yoke pattern for services where spindle threads must be kept out of the destructive effects of fluids in the line; where spindle threads must be cleaned and lubricated regularly or where a rising spindle is needed to indicate wedge position.

Choose JENKINS, whether O.S. & Y. or Inside Screw pattern, for valves built to save maintenance dollars.

WIDE RANGE OF JENKINS U-BOLT GATES

GET FOLDER NO. 207 which describes Inside Screw and O.S. & Y. patterns . . . Iron Body with Bronze or Stainless Steel Mounting . . . All-Iron and Ni-Resist with type 316 Stainless Steel trim. Ask your local Jenkins Distributor or write Jenkins Bros., 100 Park Avenue, New York 17.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
SINCE 1864
Jenkins Bros.

Sold Through Leading Distributors Everywhere

O.S.&Y. U-BOLT GATE

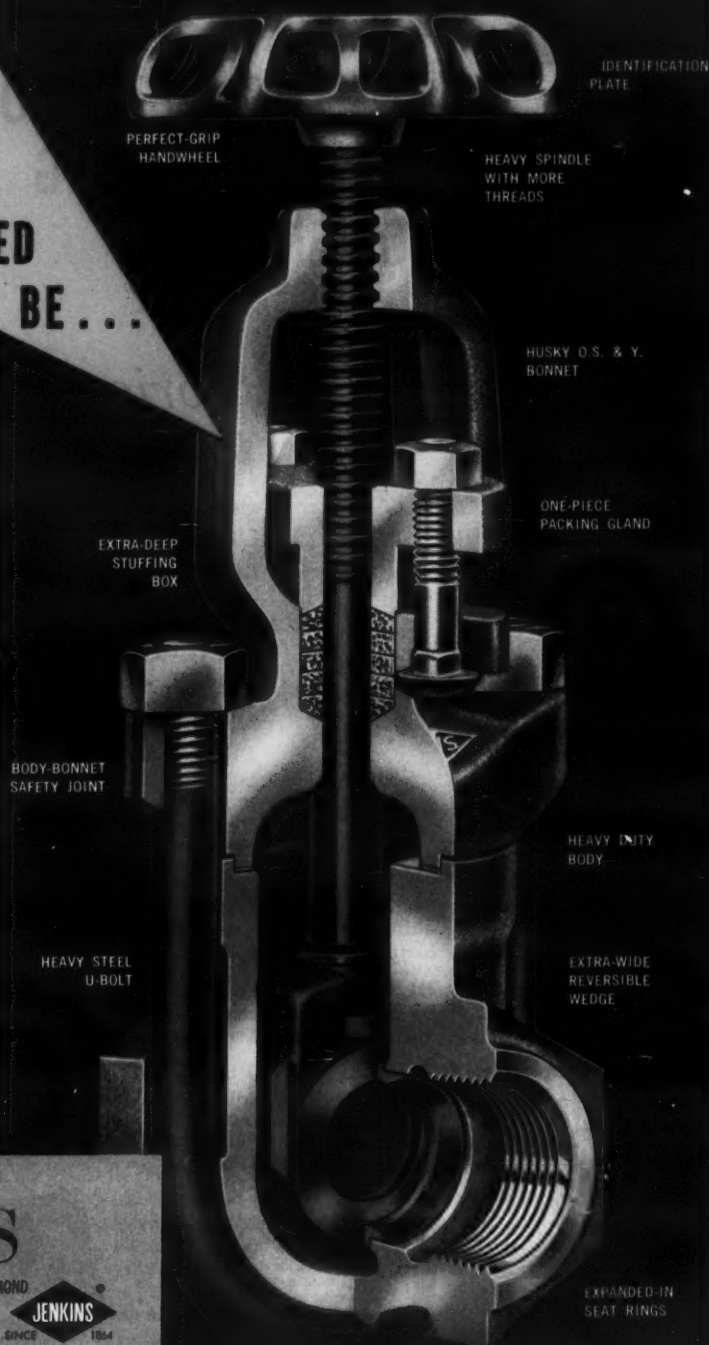
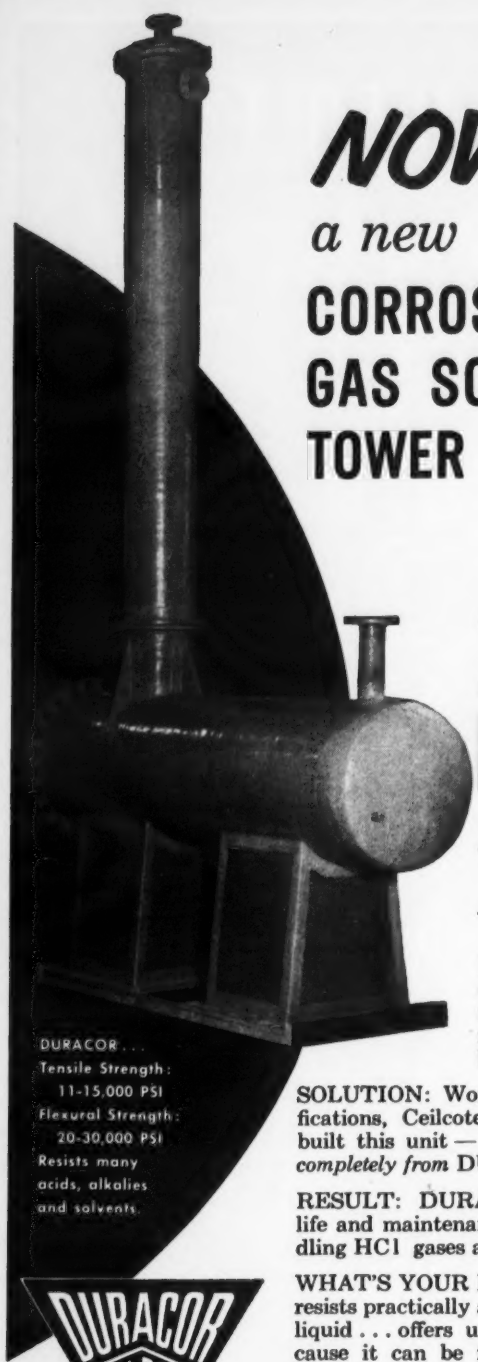


Fig. 242
Iron Body, Bronze Mounted

Check 5695 opposite last page



NOW! a new **CORROSION-PROOF GAS SCRUBBING TOWER**

*fabricated
from*
DURACOR
*Reinforced
Plastics*

PROBLEM: A large zirconium producer needed a material to withstand corrosive gases entering scrubbing towers at +300° F.

SOLUTION: Working from customer specifications, Ceilcote engineers designed and built this unit — base, body and tower — completely from DURACOR.

RESULT: DURACOR now provides long life and maintenance-free operation in handling HCl gases and chlorine.

WHAT'S YOUR PROBLEM? DURACOR resists practically any corrosive gas, fume or liquid... offers unlimited applications because it can be fabricated to any shape. Write today and tell us about your requirements.

SEE OUR INSERT IN CEC

9017-CC

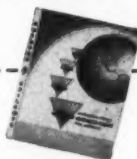
The Ceilcote Company
4834 Ridge Road • Cleveland 9, Ohio
Please send me free of charge your
DURACOR Catalog.

NAME _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____



DURACOR...
Tensile Strength:
11-15,000 PSI
Flexural Strength:
20-30,000 PSI
Resists many
acids, alkalis
and solvents.



**THE
CEILCOTE CO., Inc.**

*Birmingham, Alabama • Buffalo, New York • *Chicago, Illinois • *Cleveland, Ohio • *Detroit, Michigan • Evansville, Indiana • *Houston, Texas • Kansas City, Missouri • Los Angeles, California • *San Francisco, California • Seattle, Washington • Springfield, Massachusetts.
*Warehousing

Check 5696 opposite last page

CORROSION CONTROL

bution is further assured by baffling the gas inlet to eliminate possible turbulent effects created on the surface of the liquid by the velocity of the entering gas.

By producing this distributor as a completely separate component from the balance of the absorber, much closer tolerances can be maintained. Particularly, the weir tubes are held at true right angles to the liquid level.

(Impervious graphite liquid distributor head was developed by Falls Industries, Inc., Aurora Rd., Solon, Ohio.)

Check 5697 opposite last page.

Tests of plastic valve show top performance, corrosion resistance

Results of manufacturer's tests on plastic-body stock valve with various chemicals show it to be highly corrosion resistant. Plastic body of valve which is glass-reinforced with high-impact polyester resin provides superior performance as well as the in-



Glass-reinforced with high-impact polyester resin, plastic valve is claimed to give greater performance, corrosion resistance

creased resistance to corrosion.

Valve is said to be more economical than conventional units of a similar type.

(Plastic-body stock valve is product of W. G. Rovang & Associates, Inc., 1945 North Columbia Blvd., Portland 17, Oregon.)

Check 5698 opposite last page.

PUMPING MOLTEN CHEMICALS? write **TABER**

Whatever your pumping needs... why not put it up to Taber... long experienced pump specialists. Vertical pump illustrated, 19,478, for pumping molten chemicals. Horizontal pump, 6043, handles black liquor, caustic, etc., in evaporator service; or transfers fluids under vacuum.

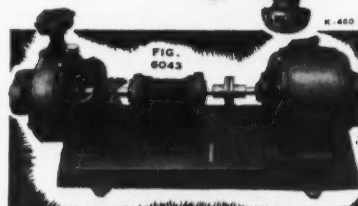
FIG. 19,478

**WRITE, ON
BUSINESS
STATIONERY
FOR
BULLETIN
V-837**

**TABER
PUMP CO.**

Est. 1859
291 ELM ST.
BUFFALO 3, N. Y.

FIG. 6043



TABER

Check 5699 opposite last page

CHEMICAL PROCESSING

**July Issue —
spotlight on
corrosion**

Fifth annual CP feature on corrosion control will spotlight story bylined by R. C. Schenck, the president of The Duriron Co., Inc., pointing to newest trends in fighting corrosion. The article will suggest how engineers can best take advantage of services, and products offered by companies in the vast field of corrosion control.

About 50 pages of latest information on subject will appear, including reports on new plastics, alloys, coatings, inhibitors, cathodic protection.

**Technical
papers**

Condensations of recent technical papers by specialists on corrosion will also appear.

**Corrosion
Keys**

More of the high-interest Corrosion Key data charts on materials of construction will be carried.

**Performance
reports**

Case history articles will tell how problems have been solved in plants.



These Stainless Steel bran shakers won't corrode, and they'll last years longer than equipment made of other, less durable materials. Because Stainless Steel is so strong, the new units at Staley's can be made thinner and lighter than comparable equipment made from other materials.

Sulfur dioxide doesn't harm Stainless Steel

at A. E. Staley
Manufacturing Company,
Decatur, Illinois

Staley's grinds and processes more than 60,000 bushels of corn daily in a continuous-flow operation that demands unfailing performance from every piece of equipment along the line.

And the equipment must be clean, for this corn is made into foods and nutrients. Corn starch, oil and syrup for the food industry must not only be chemically pure, but must be produced with food-grade cleanliness.

That's why company officials, constantly alert for any possible improvement or avoidance of trouble or contamination, were so pleased to find that Stainless Steel solved their sulfur dioxide corrosion problems. Previously the best selection of piping did show corrosion and the sulfur dioxide even attacked tanks of nonmetallic material causing porosity, cracks and corroded equipment. This increased both maintenance and control costs in producing satisfactory products.

Staley's standards called for pipes and tanks that would stay smooth and clean, impervious to the sulfur dioxide. That's why they replaced the outmoded piping and tanks with Stainless Steel.

"Stainless is the material for us," says Mills L. Calvert, Staley senior project engineer. "With stainless piping and tanks, I don't have to worry about corrosion or breakdown."

When you replace equipment in your plant, think about strong, corrosion-resistant Stainless Steel. And if you want service-tested quality, specify USS Stainless Steel. For fast delivery, call your local steel distributor.

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Warehouse Distributors
United States Steel Export Company



United States Steel

TRADEMARK

**dry chemicals flow
smoothly through
TEFLON-lined equipment**

TEFLON*—slipperiest, static-free, solid material known—keeps difficult powders and other dry materials flowing freely through hoppers, chutes, feeders, mixers, packaging machines, etc.—eliminates the need for vibrators and manual attention. And this unique lining material is also corrosion and contamination proof because it is chemically inert.

Cementable TEFLON, Garlock No. 8536, with one side treated and ready for application to any metal, wood, glass, concrete, plastics or other surface, with standard commercial adhesives, is now available in economical thin-section (.005" to .060") continuous tapes up to 12" wide, and in 1/16" and thicker sheets up to 48" x 48" in size.

*du Pont Trademark

For further information, write for Bulletin AD-158.

For prompt service, contact one of The Garlock Packing Company's 30 sales offices and warehouses throughout the U.S. and Canada, or write

United States Gasket Company
Camden 1, New Jersey

**United
States
Gasket**

Plastics Division of
GARLOCK



Check 5700 opposite last page

CORROSION CONTROL

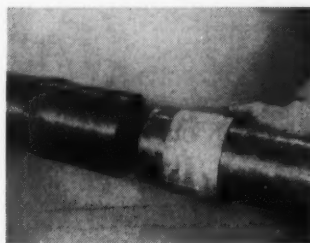
**Nontoxic, nonflammable
reinforced epoxy pipe —
collapse-resistant**

Corrosion-resistant pipe can withstand 500 psi

Uses: For carrying water, corrosive solutions, petroleum hydrocarbons and solvents, vegetable oils and greases, foods and beverages, and many other chemical solutions.

Features: Pipe is nontoxic, nonflammable, and collapse-resistant. It does not cold flow or sag in use.

Description: Reinforced plastic pipe is made of interwoven glass-fiber filaments,



Corrosion-resistant reinforced plastic pipe is claimed to be as strong as steel, while having only one-eighth the weight

impregnated with epoxy resins and heat cured. Manufactured in two to 12-inch diameters, the pipe comes in rigid 20-foot lengths with ends plain, bell-and-spigot, or flanged. Two standard series are in production, one with a nominal working pressure of 250 psi, and another rated at 500 psi. Both series have 10-to-1 safety factor. Finished pipe weighs only one-eighth as much as its steel counterpart.

Pipe is easily cut and joined in the field and requires no special tools. Basic joint is made simply by placing the spigot end of one pipe into the bell end of the next. An O-ring and a tapered sleeve, both secured with a special adhesive, seal the joint permanently against leakage.

(Bondstrand pipe is manufactured by Amercoat Corp., 4809 Firestone Blvd., South Gate, Calif.)

Check 5701 opposite last page.

Catawissa
PERFECT SEAL
Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!



**Standard & Double
Extra Heavy
UNIONS**

Available with screwed or socket weld ends. 3000-lb. sizes 1/8" to 3"; 6000-lb. sizes 1/8" to 2".



**ORIFICE
UNIONS**

With screwed or socket weld ends. 3000-lb. and 6000-lb. service.

**MALE & FEMALE
UNIONS**

With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.



**FULL STAINLESS &
FULL ALLOY
STEEL UNIONS**

With screwed or socket weld ends. 3000-lb. and 8000-lb. service.



WRITE FOR CATALOG 58
showing the complete Catawissa
line of Perfect Seal Products

**CATAWISSA VALVE AND
FITTINGS COMPANY**
620 Mill St. • CATAWISSA, PA.

Check 5702 opposite last page

CHEMICAL PROCESSING

**Non-aging, elasticity
of plastic coating
aid in protection**

Uses: As protective coating for equipment, structures, tanks, floors, and trucks.

Features: Product is said to have outstanding properties for corrosion resistance, impact resistance, long life, and weather and moisture resistance. Non-aging properties, extreme surface hardness, and elasticity provide wide range of protection.

Description: Plastic-type protective coating is formulated from a special blend of silicones and epoxies. It is a balanced chemo-setting synthetic resin coating. It contains no plasticizers or oils that normally cause saponification or progressive age embrittlement and deterioration in conventional coatings.

Coating cures by both solvent evaporation and internal polymerization, yielding a surface finish with greatly increased molecular weight and good positive bond and surface hardness characteristics.

Coating comes in three-part package consisting of resin, activator, and thinner. Brush, spray, or dip methods of application may be used as required. Drying and curing times are very favorable, and successive coat operations may be performed in a shorter time cycle than with conventional coatings, according to manufacturer. Coating is available in 22 standard colors or clear.

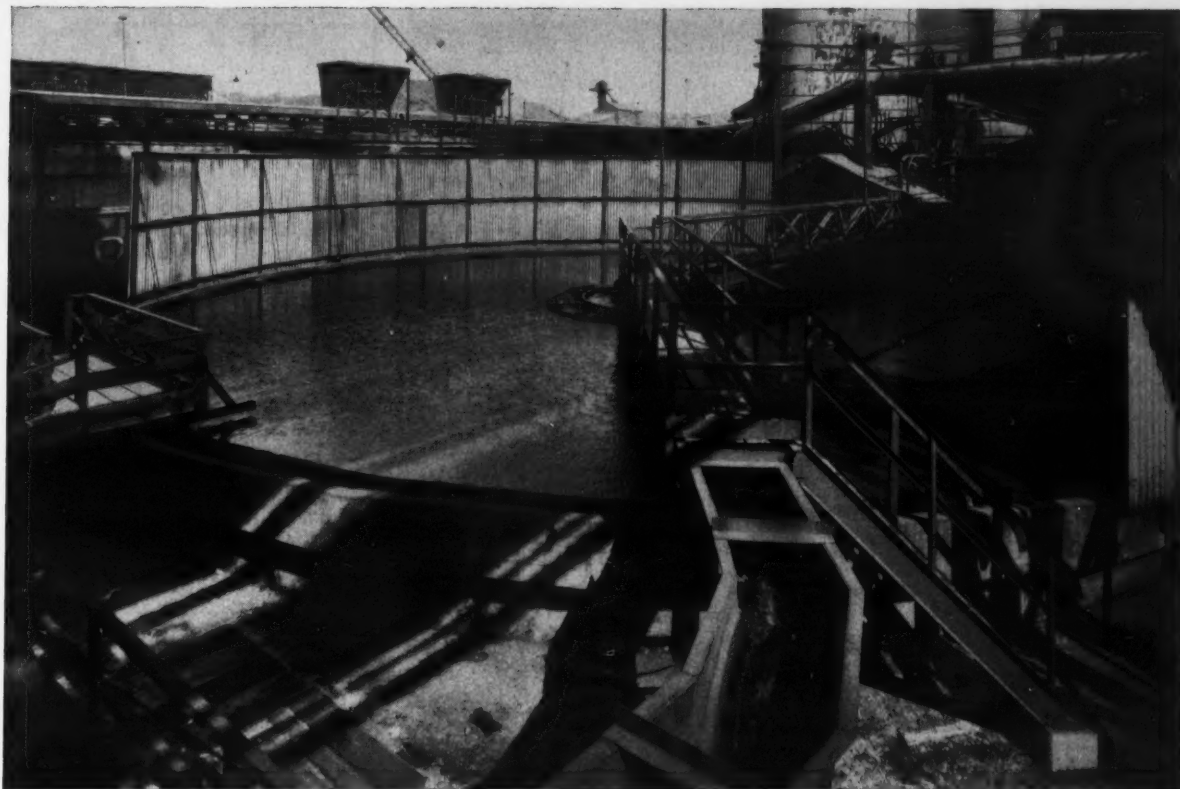
(Mono-Seal protective coating is product of Mono-Seal Products, 44 Garden St., Everett 49, Mass.)

Check 5703 opposite last page.

Plastic valve data

Advantages and specifications of manufacturer's plastic series of ball and globe valves for corrosion service are detailed in illustrated Buls C757 and C758 — Chemtrol, Div. of Tapered Air Products Corporation, 10890 Stanford Ave., Lynwood, Calif.

Check 5704 opposite last page.



Stop Costly Waste Treatment Corrosion with the Proven Protection of PITT CHEM® Coatings

Typical Waste Treatment Applications of PITT CHEM Coatings

Alkaline Waste Holding Tanks
Specify PITT CHEM TARSET®

★

Concrete Waste Water Lines
Specify PITT CHEM 101

★

Ferric Chloride Storage Tanks
Specify PITT CHEM TARSET

★

Evaporator Cooler Ducts
Specify PITT CHEM 101 or 105

HALF-WAY corrosion control methods are practically worthless for the protection of your waste treatment equipment. That's why corrosion engineers in plant after plant have turned to tough, heavy-duty *Pitt Chem* Tar Base Coatings for long-term, economical protection of iron, steel and concrete equipment against severest waste treatment corrosion.

These durable, thick-film coatings outlast ordinary paints many times over—yet they cost no more per gallon. They can be applied by spray, brush or roller—by your own men.

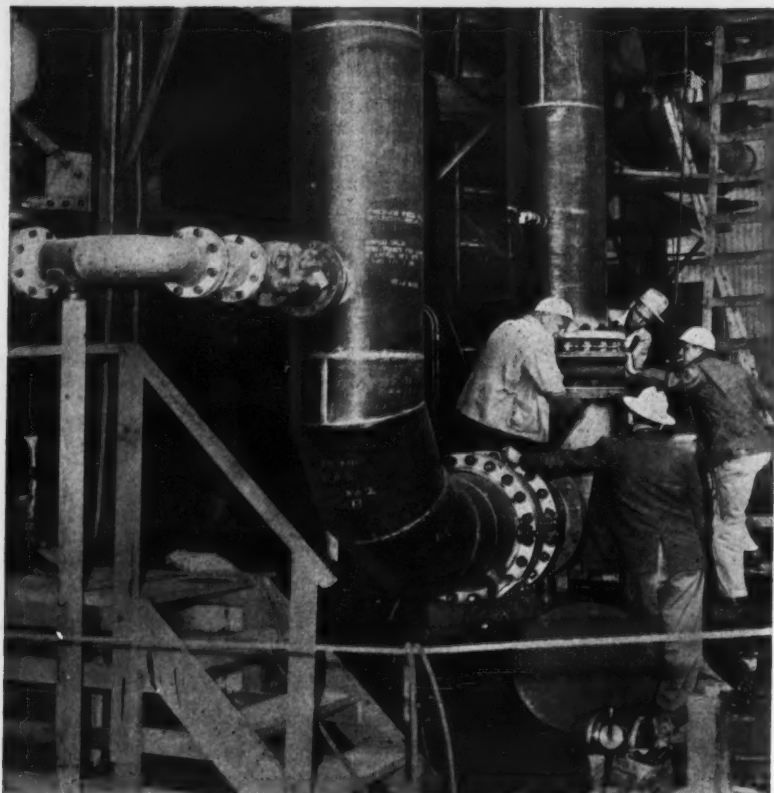
Let us show you how *Pitt Chem* Tar Base Coatings can help you save thousands of dollars that you may have been passing off as unavoidable depreciation. ● **PITT CHEM Industrial Coatings are available through leading Industrial Distributors. See the "Yellow Pages."**



WSW 6420 A

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Check 5705 opposite last page



Erecting piping at a potash refinery in Carlsbad, N. M., operated by Pacific Coast Borax and Potash Co. After nine months

service, there is no sign of stress-cracking — yet pipe and fittings were not stress-relieved or heat-treated during fabrication.

Field-fabricated without stress-cracking!

Pipe and fittings are of NEW AMPCO METAL GRADE 8

Forget your old ideas about fabricating copper-base alloy equipment to handle steam and corrosive media at elevated temperatures. New — *entirely new*—Ampco Metal Grade 8 changes all that!

Now, for example, you can get pipe and fittings that

- ... can be field-assembled, without stress-relieving — yet won't stress-crack!
- ... provide many times greater protection against corrosion and erosion
- ... can be readily welded

TS-3



... can be formed on standard equipment

... are too tough to be chewed or crushed by wrenches

... are available in all standard types and sizes — also specials.

At one major oil refinery, field-assembled piping of Ampco Metal Grade 8 has handled hot sulphuric-acid sludge for a year and a half without stress-cracking.

Sound promising? It is! Ask your Ampco field engineer about new, patented Ampco Metal Grade 8. Or write for details. *Ampco Metal, Inc., Dept. CP-6, Milwaukee 46, Wis. West Coast plant: Burbank, Calif. —Southwest plant: Garland (Dallas County), Texas.*

AMPCO

Check 5706 opposite last page

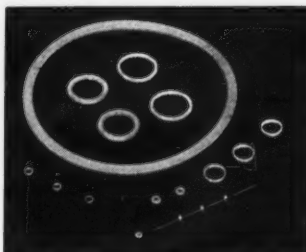
CORROSION CONTROL

For extreme applications, .001" tolerance furnished by plastic ring seals

Uses: For extreme temperature, pressure, and corrosive applications in chemical process and other fields.

Features: Seals have dimensional tolerances of .001" and less.

Description: Chemical and mechanical seals of Teflon are based on new, high-density plastic stock. "O" and "V" rings with square, round, and oval cross-sections are avail-



Teflon ring seals can be obtained with dimensional tolerances of .001" and less

able. Seals have been subjected to pressures of 30,000 psi, temperatures of from -200 to 425°F, and corrosives such as fuming nitric acid without failure.

(Teflon "O" and "V" ring seals are available from Tri-Point Plastics, Inc., 175 I. U. Willets Rd., Albertson, L.I., New York.)

Check 5707 opposite last page.

Permits economical use of impervious graphite centrifugal pump

Uses: For pumping corrosive materials.

Features: Pump is constructed with use of impervious graphite, which is almost universally corrosion resistant, with exception of few high-oxidizing agents such as nitric acid and HF. Unit can be maintained without disassembling piping or motor.

Description: Close-coupled single-stage centrifugal pump is smaller than a comparable capacity pedestal-mounted de-

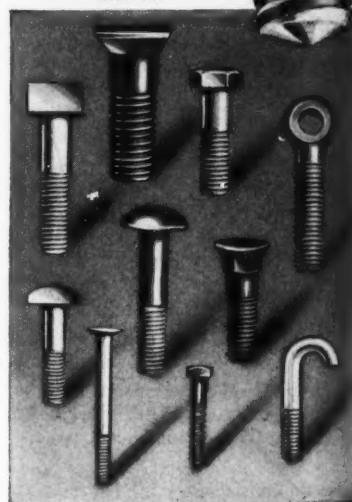
Threaded Specialties

lower cost
EYE BOLTS
by an
exclusive method

Among Pawtucket's many specialty products are these lower-cost eye bolts or "swing" bolts. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket eye bolts are made in standard sizes 1/4" and larger, or to your specifications. In any size, you can depend on uniform Class 3 fit, if required.

All standard steels, stainless steels and non-ferrous metals, including Titanium

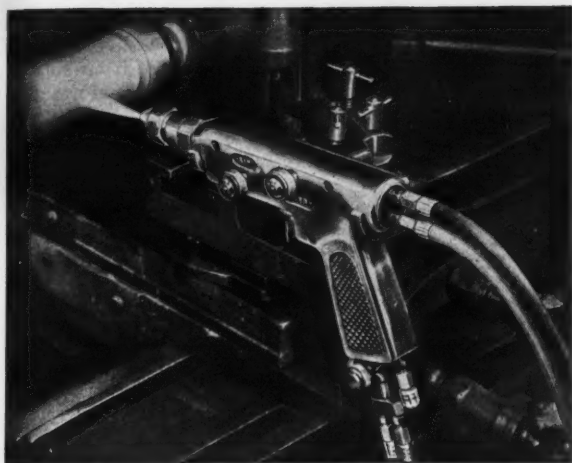


BETTER BOLTS SINCE 1882

PAWTUCKET
MANUFACTURING COMPANY
327 Pine St. • Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS
T.M. REG.
"The Bolt Man"

Check 5708 opposite last page
CHEMICAL PROCESSING

STOP CORROSION

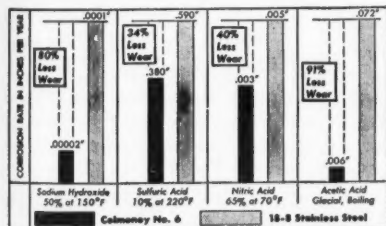


with Colmonoy Spraywelding

The superior corrosion resistance of Colmonoy No. 6 alloy makes it the ideal hard-facing material for use on surfaces undergoing metal-to-metal wear under corrosive conditions, such as pump and valve parts.

The Colmonoy Spraywelder puts No. 6 on fast, in powder form. It makes smooth overlays within .010" of desired size, requiring a minimum of finishing. Spraywelded overlays are solid and welded to the base metal.

The corrosion of vital process equipment parts becomes needless waste when the wear resistant qualities of Colmonoy No. 6 are combined with the economy and ease of the Spraywelder.



This table shows the comparative resistance to corrosion of Colmonoy No. 6 and 18-8 stainless steel. No. 6 is resistant to almost all caustics and acids. Ask for Engineering Data Sheet No. 3.

WRITE RIGHT NOW

For the Colmonoy Spraywelder Catalog and Hard-Facing Manual No. 79

HARD-FACING & BRAZING ALLOYS WALL COLMONOY CORP.

19345 JOHN R STREET • DETROIT 3, MICHIGAN

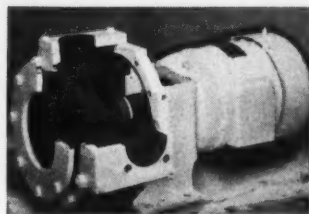
BIRMINGHAM • BUFFALO • CHICAGO • HOUSTON • LOS ANGELES
MOORESVILLE, PA. • NEW YORK • PITTSBURGH • MONTREAL • GREAT BRITAIN

Check 5709 opposite last page

CORROSION CONTROL

sign. The 40 gpm/40 ft-head model measures 24 in long by 12 in by 12 in.

Close-coupled model is available with almost any standard seal or stuffing box. (Normally supplied seal is



Centrifugal pump can be maintained without disassembling pipe or motor

self-cooling, self-lubricating carbon to carbon rotary.)

Where difficult corrosives are handled, this seal provides absolutely positive knowledge of correct seal adjustment. When seal faces wear and there is slight dripping, there is no confusion between product being pumped and coolant, which would be the case in externally cooled and lubricated seal.

(Impervious graphite centrifugal pump is product of Falls Industries, Inc., Aurora Rd., Solon, Ohio.)

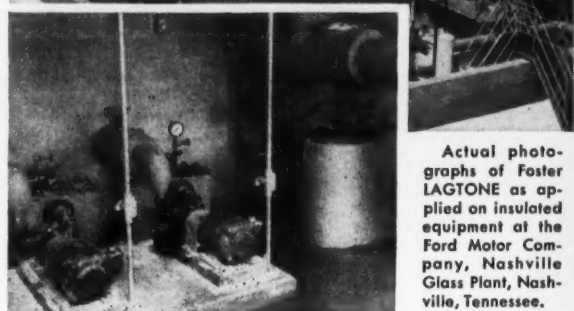
Check 5710 opposite last page.



"What d'ya mean—what does he do? He bowls a 175 average in the industrial league, that's what he does!"

Thanks to Tom Blakley, Florida East Coast Fertilizer Company, Homestead, Fla.

INSULATION ON YOUR PLANT



Actual photographs of Foster LAGTONE as applied on insulated equipment at the Ford Motor Company, Nashville Glass Plant, Nashville, Tennessee.

Foster Lagtone, a rugged easily applied coating, will cover and protect all your insulated pipes, ducts, and equipment.

No highly flammable or toxic solvents in Lagtone . . . wet it is non-flammable . . . dry it is fire-resistive, weather-resistant, fume-resistant.

Since Lagtone is a "breather" type coating, it is ideal for insulations on heated lines and equipment.

Foster Lagtone is available for use on insulated pipes, vessels, and ducts in colors selected to blend with industrial color schemes.

Lagtone comes ready for immediate use and can be applied by brush, spray or roller over glass-fabric, asbestos-cloth or light canvas jackets for lagging and sealing.

Contact your local Foster Representative or write direct for full color brochure and more complete information on what Foster products can do for you.

foster COATINGS • SEALERS • ADHESIVES for thermal insulation

BENJAMIN foster CO. • 4635 W. GIRARD AVE. • PHILA. 31, PA.

SOLD BY AMERICA'S LEADING INSULATION DISTRIBUTORS AND CONTRACTORS

Check 5711 opposite last page

**PERMANENT
ALLOY IDENTIFICATION
ON ALL...**



CAST ALLOY

MSS and ASA STAINLESS FLANGES

Conveniently warehoused stocks of *ESCO* Stainless Flanges are available in all styles; welding neck, threaded companion, slip-on, lap joint and blind. Alloys 45 (Type 316), 40 (Type 304), and 20* are carried in 150-lb. MSS and ASA standards in a complete range of sizes from 1/2" to 12". Hastelloy Alloy** B and C flanges are stocked up to 4" IPS sizes. Flanges for pressures above 150 pounds or in alloys other than listed are available promptly on special order. Alloy designation is "in-the-metal" on each piece for permanent identification.

All ASA flanges are machined on all surfaces and wrapped in polyethylene to prevent scarring.

ESCO Spuncast® pipe and special cast fittings can be made to your engineering requirements.

*Duriron Licensee **Haynes-Stellite Licensee

See your *ESCO* Dealer. Ask for catalog No. 156.



**ELECTRIC STEEL
FOUNDRY COMPANY**

2186 N. W. 25TH AVE. • PORTLAND 10, OREGON
MFG. PLANTS AT PORTLAND, ORE. AND DANVILLE, ILL.
Offices in Most Principal Cities
ESCO INTERNATIONAL, NEW YORK, N. Y.
IN CANADA ESCO LIMITED

Check 5712 opposite last page

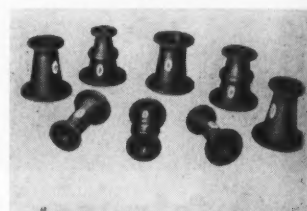
CORROSION CONTROL

**Connector flexing action
keeps rubber 'alive'
in corrosive service**

Uses: As flexible connections in pressure and vacuum systems handling water, brine, gases, and chemicals.

Features: Because of flexing action which keeps rubber "alive", and free from embrittlement and scale formation, connections give long, trouble-free life in difficult corrosive and abrasive services.

Description: Rubber expansion joints are available from 1/2 through 72" ID, in standard straight-through or re-



Flexing action of expansion joints keeps rubber free from embrittlement and scale formation

ducing types, with or without filled arch or liner, and with either full-faced or enlarged slip-over pipe ends.

Flexible rubber pipe is available in 1/2 to 72" ID, in lengths up to 50', and finished with either full-faced flanges or enlarged slip-over pipe ends.

Standard pieces are recommended for working temperatures to 180°F and pressures to 150 psig, or 30" Hg vacuum service.

(Rubber expansion joints and flexible pipe are available from General Rubber Corporation, Tenafly, N. J.)

Check 5713 opposite last page.

Lining resists corrosion

Description of corrosion-resistant plastic lining material which can be applied to any surface having almost any contour is contained in four-page bulletin. Bul AD-152 — The Garlock Packing Co., Palmyra, N. Y.

Check 5714 opposite last page.



At Universal Atlas Cement Co.'s modern plant,
rotary car dumper . . .

Unloads Open-Top Car in 60 Seconds

GEORGE V. MICHAEL

Assistant Editor

With GILBERT N. PETERSON

Assistant Plant Manager

Universal Atlas Cement Co.

Gary, Indiana

PROBLEM: When Universal Atlas Cement Co., subsidiary of US Steel, added a new plant to their Gary, Ind., installation, they wanted a fast, sure method for unloading open-top hopper cars. Cars deliver blast-furnace slag and coal to the installation.

Around 130 cars are unloaded each week. Delivery is spotty, and Universal Atlas didn't want to tie up men and cars with usual hopper-car unloading procedures.

Solution: When the plant was completed, it included a rotary car dumper to handle unloading of these materials. Car-dumping unit is operated and controlled by one man from control tower. Same operator also controls four apron conveyors which carry materials from receiving hopper to storage conveyor.

Unloading procedure is like this: Switch engine spots front car on dumper's platen. Railroad crew uncouples it and train pulls back leaving single car on platen. Operator in control tower pushes button to start dumping operation.

As unit starts to rotate, the movement causes platen to move sideways towards spill girder (a steel plate on dumping side) which supports tilted car. Spring-actuated platen lock then engages and prevents further relative motion of the platen.

Simultaneously, two beam-type automatic clamps descend by gravity and seat themselves on top of car to hold it securely

against rails. Positive-acting clamp mechanisms assure car will be held in place at all times during cycle. Upon reaching extreme dumping position, rotation is automatically stopped by means of limit switch control.

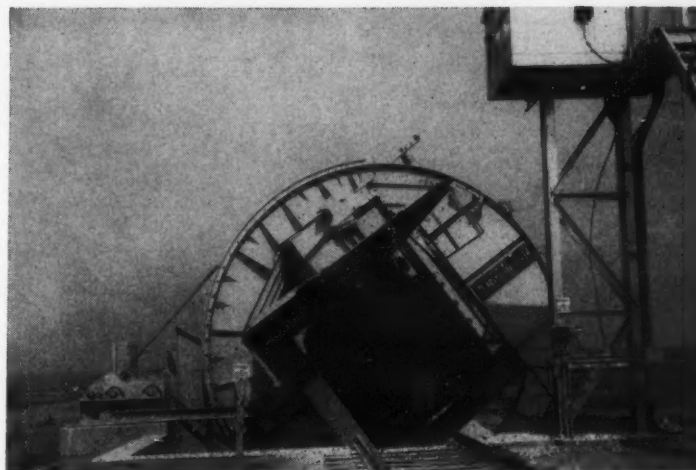
Actually, as soon as sufficient angle is attained, material starts to fall from car through grate into receiving hopper. All material is dumped by the time car reaches end of travel.

This particular unit is semi-automatic — operator pushes button to return car to upright position. As rotation is reversed, clamps are raised, and platen hook engages a foundation pedestal to align the rails. In final degrees of rotation, car and platen move away from spill girder so that empty car can be removed and next loaded car received.

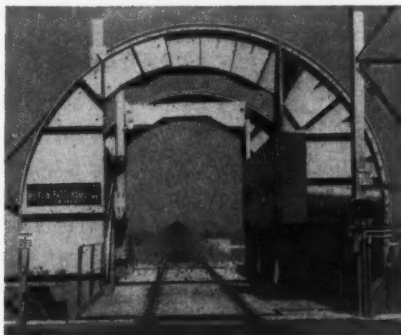
Full cycle can be completed in one minute. Operator can stop and hold the dumper in any position.

Empty car is then bumped off platen and down incline to "kick-back" ramp. In its travel down the incline to ramp, car throws a switch so that when it is kicked back, it is automatically switched to a return track. Retarders in return track slow car down as it approaches previously unloaded cars.

Material that has been dumped is fed from receiving hopper by apron feeders to belt conveyor carrying it to storage.



Over and out! Rotary car dumper unloads coal and blast-furnace slag from open-top hopper cars in one minute. Unit up-turns car to dump material into hopper from which it is conveyed to storage



Rotary car dumper will handle cars of various sizes and capacities. Kick-back track for delivering empty cars to return track is in center background

Car dumper is designed to handle open-top cars with inside lengths of 30 to 56' and extreme widths of 9'9" to 10'9". Clamps will accommodate various height cars from 6'4" to 12'7". Design tolerances will allow unit to handle easily a car carrying capacity of 90 tons.

Results: Unit can dump 30 cars per hour. However, with present set-up, Universal Atlas can handle all bulk materials delivered by rail for dumping by maintain-

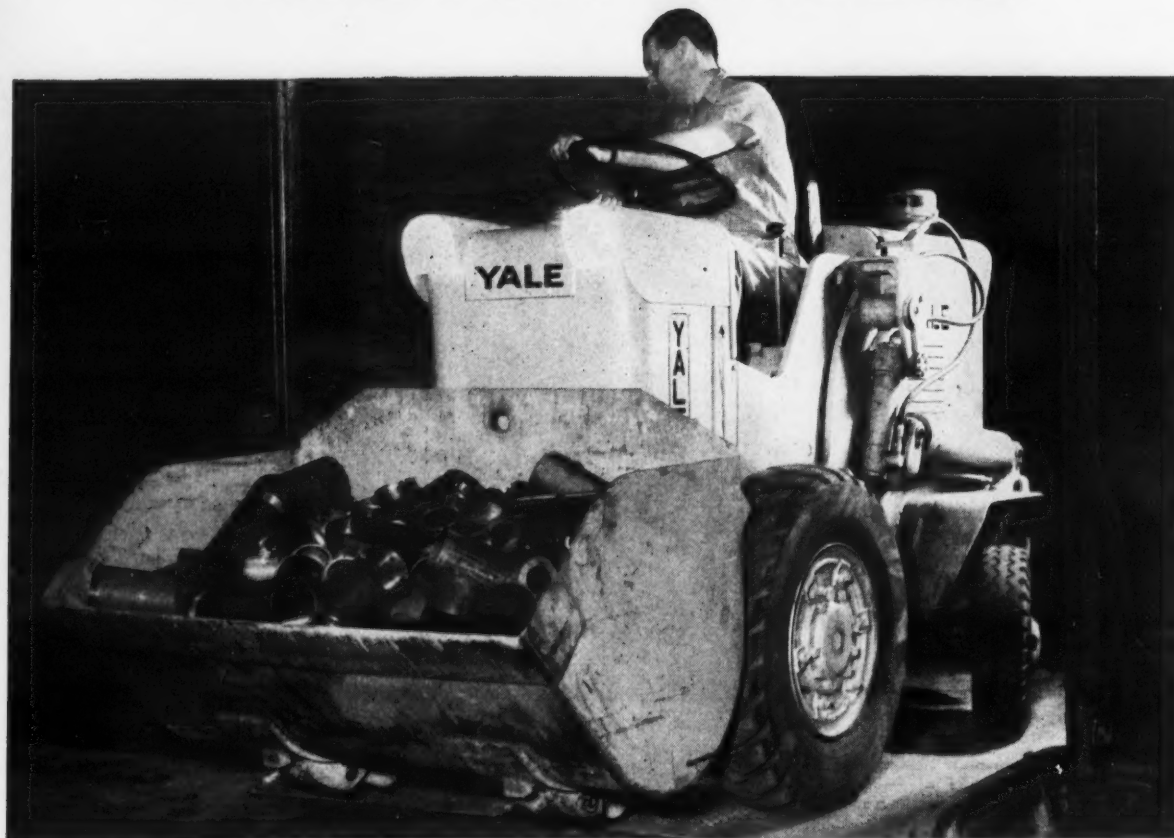
ing its unloading rates at 6 or 7 cars per hour. Future plans include using the unit to unload sand when a conveying system for that purpose is installed.

To date, occasional greasing and brake adjustments represent only maintenance required.

(Rotary car dumper is manufactured by Heyl & Patterson, Inc., 55 Fort Pitt Blvd., Pittsburgh 22, Pennsylvania.)

Check 5715 opposite last page.

NEW YALE INDUSTRIAL TRACTOR SHOVEL



Carries more tonnage every hour
—field tests prove it!

Actual field tests prove the amazing work-capacity of the new Yale Industrial Tractor Shovel. Extra tonnage—extra work—extra duty cycles! Operating acceleration speed is 8 mph in 3.5 seconds. And Yale's exclusive fully automatic Torque Transmission produces quicker, smoother starting, more power under load conditions.

Loader-linkage advantages are unique. Exclusive 45° ground-level tipback provides top loading action, minimum spillage in grade-level position. Exclusive 6' dumping

clearance (highest on any model of similar wheelbase) automatically returns bucket from full dump position to dig position.

Let your operator work with it. He'll like the roomy, clear cockpit—the finger-tip controls—the ease of handling—the fact that there are no gears to shift. He'll especially like Yale's exclusive Safety-Curve Arms—that never rise above the side frame to cause injury. For a demonstration in your plant or further data write The Yale & Towne Manufacturing Co., Philadelphia, Pa., Dept. A126.

COMPARE THESE YALE FEATURES:

- Exclusive Yale Torque Transmission (fully automatic)
- Exclusive 45° ground-level bucket tipback
- Exclusive 6' dumping clearance
- Exclusive Safety-Curve Arms
- Exclusive acceleration speed to 8 mph. in 3.5 sec.
- Exclusive sealed brakes
- Exclusive forward and rear operating lights
- 2500 lbs. carrying capacity
- Short wheelbase for minimum turning radius
- Gasoline or LP-Gas powered

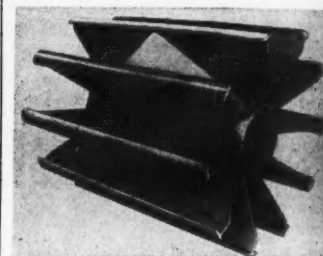
HANDLING & PACKAGING

Longer belt life assured, misalignment prevented by self-cleaning pulley

Uses: For conveyor applications.

Features: Because self-cleaning cone design eliminates material build-up between belt and pulley, longer belt life is insured and misalignment prevented.

Description: Steel self-cleaning conveyor pulleys are available in 3000 standard sizes.



Self-cleaning pulley design insures longer belt life

Sizes range from 8 to 60" in diam and from 8 to 66" in face width. Bore sizes range from 1/2 to 10". Outer edge of each individual wing of unit is protected by half oval bar that reduces belt strain and provides maximum traction.

(Conveyor pulley is product of Van Gorp Manufacturing Co., Inc., Box 123, Pella, Ia.)

Check 5717 opposite last page.

Controlled pouring insures maximum operator safety on hydraulic drum lift

Uses: Designed basically for 55-gallon drums; but unit can be adapted to handle other sizes of steel or fiber drums.

Features: Gear-reducer control device assures self-locking, and absolute control at any pouring angle. Pouring control affords maximum safety to operator when caustic or toxic materials are being handled. Unit enables operator to remain well away from pouring operation.

Description: Hydraulic drum lift is ruggedly constructed of square steel tube. It has 49" length, 56 1/2" height,

YALE*
REG. U. S. PAT. OFF.

YALE & TOWNE

INDUSTRIAL LIFT TRUCKS & TRACTOR SHOVELS • HOISTS

GASOLINE, ELECTRIC, DIESEL & LP-GAS INDUSTRIAL LIFT TRUCKS • WORKSAVERS
WAREHOUSERS • HAND TRUCKS • INDUSTRIAL TRACTOR SHOVELS • HAND AND ELECTRIC HOISTS

YALE MATERIALS HANDLING DIVISION, THE YALE & TOWNE MANUFACTURING CO. MANUFACTURING PLANTS: PHILADELPHIA, PA.; SAN LEANDRO, CALIF.; FORREST CITY, ARK

Check 5716 opposite last page



Controlled pouring affords maximum operator safety

and 38" width. Unit is mounted on spark-proof wheels for safety.

Device has lifting capacity of 750 lb. Drums can be raised to a height of 70" in a matter of seconds by foot-actuated hydraulic jack.

(Model CP-1 hydraulic drum lift is manufactured by Sterling, Fleischman Company, PO Box 94, Broomall 1, Pa.)

Check 5718 opposite last page.

Bucket elevator features low loading height

Uses: Elevating powdered or granular materials at rates up to 15,000 lb per hr.

Features: Height of loading hopper is 25½" above floor to facilitate charging.

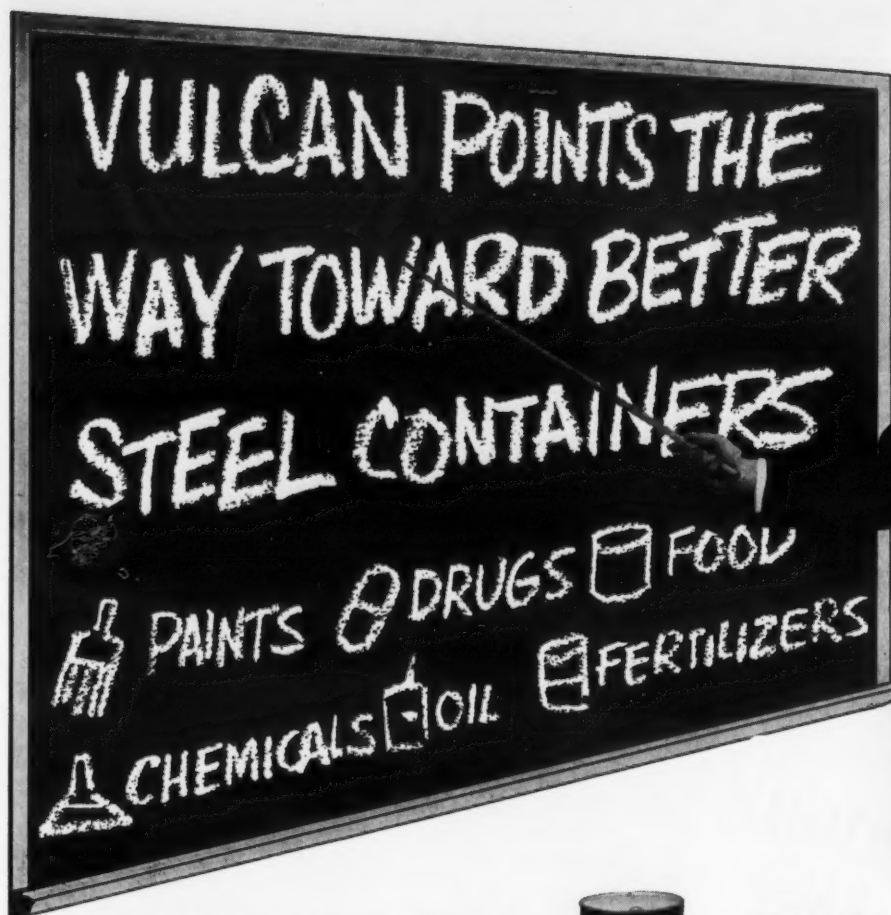
Description: Standard body sections are available in 2½, 5, and 10' sections, easily bolted together to make elevators up to 30' high.

Design features include small cross-section to fit into tight machinery layouts, low headroom, and sealed ball bearings on all shafts. Front panel in sections is removable to expose entire belt.

Units can be modified on order to provide portability, special hoppers, bottom drive, vibrating feeding, and special capacities.

(Bucketlift Jr. is manufactured by M-H Standard Corporation, 513-521 Communipaw Ave., Jersey City 4, N.J.)

Check 5718A opposite last pg.



VULCAN STEEL PAILS



The manufacturer needing a small package for his requirements can choose exactly the right size and type from the complete Vulcan line of steel pails. Vulcan offers a choice of gauges in both lug cover and closed head types in sizes ranging from one to fifteen gallons.



VULCAN STEEL DRUMS

These drums are the choice of leading manufacturers for the shipment and storage of liquids, plastics, crystals, semi-solids, and powders. All standard drum gauges are available... check with us regarding closures and accessories.

CHECK WITH VULCAN ON THESE TOO!

GREASE DRUMS... Available in both 120 and 100 pound capacities.

15 GALLON DRUMS... A new addition to the Vulcan line—available in open head and closed head types.



Vulcan offers real flexibility with a choice of linings, closures, accessories, and various painting and decorating services. Mail coupon for full information and the name of your Vulcan representative.

VULCAN CONTAINERS INC., Bellwood, Illinois

Gentlemen: I am interested in: CP-63

- ☐ Pails, in the following sizes _____
☐ Hi-Bake protective linings for (product) _____
☐ 55 gallon drums.

Please get this information to

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

Check 5719 opposite last page

* Constant Source of Supply

A "Background" of vast forest reserves, basic pulp production and kraft paper manufacturing is behind every Multiwall order serviced by Raymond. As a division of the Albemarle Paper Mfg. Co., Raymond provides Multiwall users with a dependable source of supply, assuring the prompt deliveries necessary to meet production schedules of today's manufacturing lines.

Special Problem? New Multiwall developments may be the answer. Write Raymond Bag Corporation, Research & Development Division, Middletown, Ohio.



Raymond

BAG CORPORATION
A division of Albemarle Paper Mfg. Co.
MIDDLETOWN, OHIO • RICHMOND, VA.

HANDLING & PACKAGING

'Flying handle' worries are now eliminated in hand lift truck

Uses: Moving skidded loads up to 5000 lb.

Features: Automatic engagement and disengagement of handle eliminates danger from "flying handle."



Single stroke lifting is feature of safe skid truck

Description: Handle engages for lifting without extra treadle operation and automatically disengages when pulled by operator. Truck has separate treadle for controlled hydraulic lowering.

(Red Arrow hand lift truck is product of Lift Trucks, Inc., Cincinnati 14, Ohio.)

Check 5721 opposite last page.

Rotary tabletting presses make multi-layer tablets with accurate measure

Uses: For tabletting in pharmaceutical, food, and various industrial fields.

Features: Machine can produce two- and three-layer tablets, with each layer distinctly separate from the others and containing a precisely controlled weight material.

Precompression of each layer of material after it has been filled into die creates sharply defined surfaces between layers, and permits ejection of individual layers for accurate weight-check while machine is running at any desired production speed.

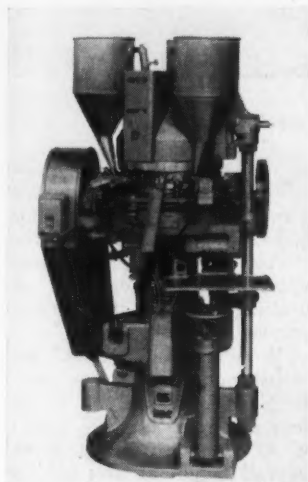
Description: Rotary tabletting presses are equipped with

Check 5720 opposite last page

HANDLING & PACKAGING

adjustable upper rolls which provide easy and accurate adjustment of precompression and final compression strokes. Each fill station has its own hopper, feed frame. Special feed frames wipe die table clean for positive separation of materials.

Material for each layer is accurately weighed and fill



Multi-layer tablets with accurately measured separate layers can be produced on rotary tabletting press

station adjusted accordingly, when setting up press. To correct variations which may arise in consistency of granulations from batch to batch, individual precompressed layer is manually ejected, its weight checked, and proper fill station adjusted to compensate. All this is done while machine is in full operation.

(Rotary tabletting press is product of F. J. Stokes Corporation, 5500 Tabor Rd., Philadelphia 20, Pa.)

Check 5722 opposite last page.

Coal alarm system

Data sheet describes system that provides automatic protection against coal supply failure in pulverizer- or stoker-fired operations. Drawings show components of system. Data Sheet 5703 — Richardson Scale Company, Clifton, N. J.

Check 5723 opposite last page.

Now! Revolutionary new Indox V Pulley*



- Outperforms conventional permanent magnet pulleys
- Equals deep-field power of electromagnetic types,

but...

- | | |
|----------------------------|---|
| ▶ costs nothing to operate | ▶ eliminates heat |
| ▶ free from power failures | ▶ impervious to moisture |
| ▶ eliminates rectifier | ▶ radial design boosts holding efficiency |
| ▶ needs no maintenance | |

Never before could you expect tramp iron protection like this with a permanent magnet pulley! Performance of the new Stearns Indox V pulley is equal to that of electromagnetic types—yet it has all the cost-saving advantages of permanent magnet design

Indox V is the amazing *ceramic magnet* material used exclusively in Stearns pulleys. It is the heart of an entirely new magnet assembly with *radial pole design*. This feature produces a strong magnetic field that blankets the conveyor burden, pulls out troublesome tramp iron far more efficiently than old-style permanent magnet pulleys.

The Indox V pulley needs no energizing current. It costs nothing to operate, requires no maintenance, ignores power failures.

Stearns Series "410" Permanent Magnet Pulleys — and Stearns "710" for deeper conveyor burdens — are available in standard widths from 12 to 48 inches, and in diameters of 12, 15, 18, 20 and 24 inches. Stearns engineers will help you select the right Indox V Permanent Magnet Pulley to match your conveyor system. Call your Stearns representative, or write for free literature.

*Patents Pending



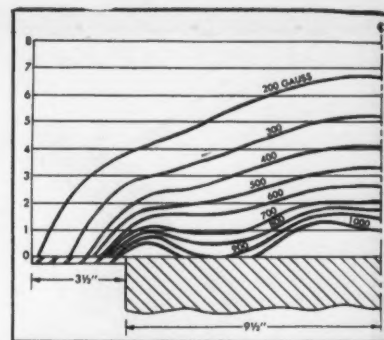
STEARNS MAGNETIC PRODUCTS

A DIVISION OF THE INDIANA STEEL PRODUCTS COMPANY

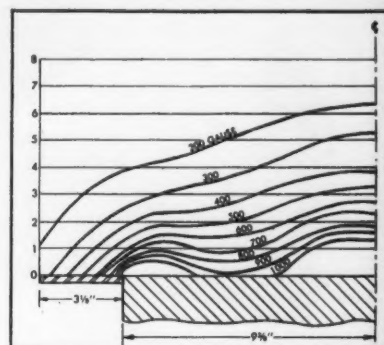
635 SOUTH 28TH STREET

MILWAUKEE 46, WISCONSIN

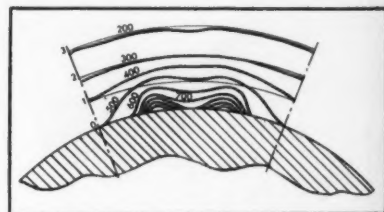
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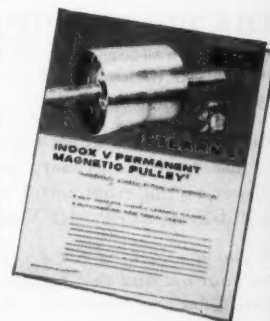
GAUSS PATTERN: SIZE 18 x 24 ELECTRO MAGNETIC PULLEY, AT 80% OF RATED CURRENT



GAUSS PATTERN: SIZE 18 x 24 INDOX V PERMANENT MAGNETIC PULLEY



GAUSS PATTERN: SIZE 18 x 24 ALNICO V PERMANENT MAGNETIC PULLEY



Free Booklet describes the new Stearns Series "410" and "710" Indox V Magnetic Pulleys. Write today for Bulletin 1021-P



HERE'S HOW INLAND HELPS JOHNSON'S WAX LIGHTEN THE BURDEN OF HEAVY TRAFFIC FLOORS. When the makers of Johnson's Wax developed their entirely new STEP-AHEAD floor finish for heavy traffic commercial application, their next objective was delivery of this remarkably effective product into the hands of users, "as shipped."

Factory fresh condition, complete freedom from contamination, ease of shipment and readiness for use, were the primary considerations. Inland Steel Container packaging specialists had the answer to this requirement by supplying Johnson with a drum "protectioneered"* with a lining that delivers STEP-AHEAD floor finish . . . ready for use anywhere in the world.

If you are looking for a complete packaging service for your old and new products, call your Inland Steel Container representative. Backing him up is Inland's nationwide reputation for—solving the tough ones!

**the right container, with the right lining for your product*

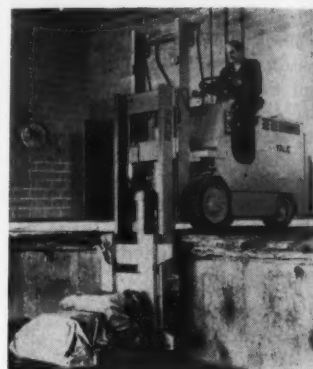
INLAND STEEL CONTAINER COMPANY

Member of the **INLAND** Steel Family

6532 South Menard Avenue, Chicago 38, Illinois
Plants: Chicago • Jersey City • New Orleans
Cleveland & Greenville, Ohio
Full line of steel and stainless steel shipping containers, including galvanized and heavy duty ICC drums.



HANDLING & PACKAGING



Special lift truck . . .

. . . has been developed for below-ground-level handling jobs. Truck can be used for such assignments as handling in pits, lowering palletized materials into dipping or cleaning tanks, or transferring material in a varied-floor-level plant. In 6000-lb capacity model, truck can handle loads off a level 72" below floor and raise them to height of 41" above ground level. Overall height of unit is only 83". Below-ground-level lift truck is product of Materials Handling Division, The Yale & Towne Manufacturing Co. 11,000 Roosevelt Blvd., Philadelphia 15, Pa.

Check 5726 opposite last page.

Plastic packaging data

Low-cost packaging with plastics for both product protection and eye appeal is illustrated in manufacturer's eight-page "1958 Guide to Improved Packaging" — Bakelite Company, Div. of Union Carbide Corporation, 260 Madison Ave., New York 16, New York.

Check 5727 opposite last page.

Compact magnetic grates Install easily, quickly into vertical flow-line

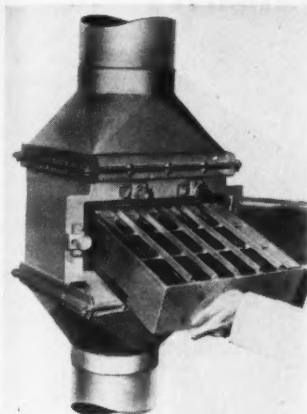
Uses: Separating tramp or fine iron from dry free-flowing materials in vertical gravity flow lines.

Features: Design incorporates grates and their housing

Check 5725 opposite last page

HANDLING & PACKAGING

in a single package, ready for instant mounting in a simple opening. Hinged and gasketed door front encloses and holds double-banked magnetic grates within the housing, making units readily accessible for periodic removal of iron accumulations.



Magnetic grates and housing come as a single package for simple and quick mounting into vertical flow lines

Description: Unit designed for fine iron particles differs from tramp iron separator in having closer spacing of magnetic tubes, composing grate. For applications involving material of a nature that will not readily flow through series of openings between the tubes, units equipped with vibrator mounted on housing can be supplied.

(Magnetic grate separators are manufactured by Eriez Mfg. Co., Erie 6, Pa.)

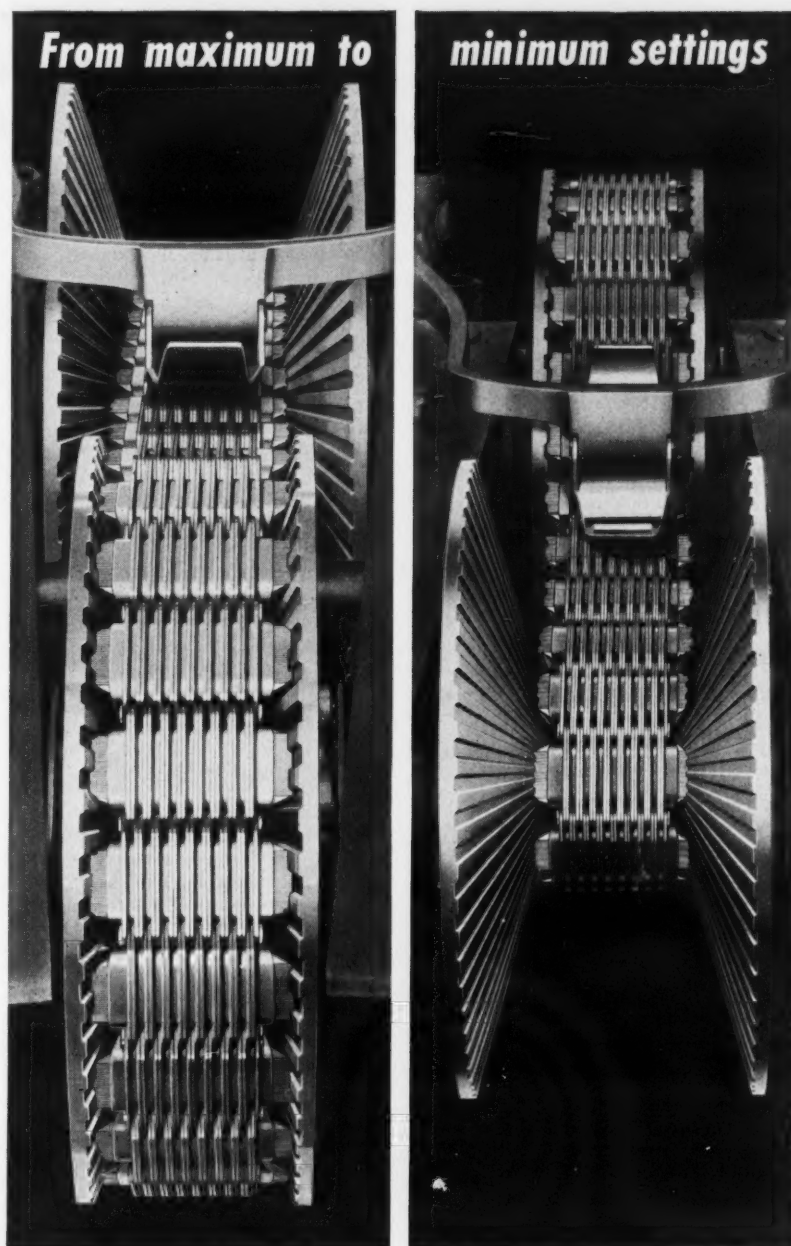
Check 5728 opposite last page.

Hand lift truck manual

Manual of 16 pages answers four prime questions about mechanical and hydraulic hand lift trucks — what they are, how they operate, how to select, and how to use. "Mechanical and Hydraulic Hand Lift Trucks" — Association of Lift Truck & Portable Elevator Manufacturers, Suite 759, One Gateway Center, Pittsburgh, Pa.

Check 5729 opposite last page.

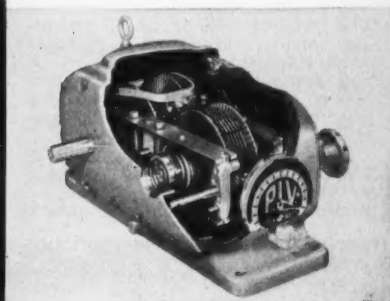
For positive, accurate speed control ...there's nothing like P.I.V.



VARIABLE from top speed to minimum speed with no steps, no stops in between. That's Link-Belt P.I.V.—the *only* chain-driven variable speed drive. Teeth—not tension—permit instant ratio changes with no loss of speed, regardless of load conditions.

Slippage? Not a chance—P.I.V.'s chain-to-wheel grip is positive as a gear. In fact, this is industry's most accurate, most reliable *mechanical* variable speed drive.

Your Link-Belt office or authorized stock-carrying distributor has Book 2274 on P.I.V. drives from ½ to 25 hp. Refer to the yellow pages of your local phone directory under Power Transmission Equipment.



HOW P.I.V. WORKS. Exclusive self-tooth-forming chain of P.I.V. consists of packs of free-sliding steel slats which serve as teeth. Chain grips beveled grooves on pairs of conical wheels located on input and output shafts. Speeds are changed by varying the effective diameters of the wheels, as shown at left.

LINK-BELT
P.I.V. VARIABLE SPEED DRIVE

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.813

Check 5730 opposite last page

Ask Standard

*how to
cut costs with
conveyors*



JERSEY COAST FREIGHT LINES, INC., NEPTUNE, NEW JERSEY, uses a variety of Standard conveyors. Here, powered EXTENDOVEYORS and gravity roller conveyors move freight from trucks to handler for distribution to three conveyor lines in terminal. EXTENDOVEYORS can stretch and retract.

"Tailored" conveyors handle small shipments 66% faster

The formerly tedious job of unloading, sorting and reloading multiple small shipments at this terminal is now a fast, easy operation. A system of Standard conveyors has cut handling time 66%, eliminated congestion, reduced physical effort.

This smooth-functioning system typifies the efficiency and economy possible with Standard conveyors... wherever materials must be moved.

They're easy to install and exceptionally durable, offer maximum flexibility at low costs, can be designed to meet any operation or space requirement.

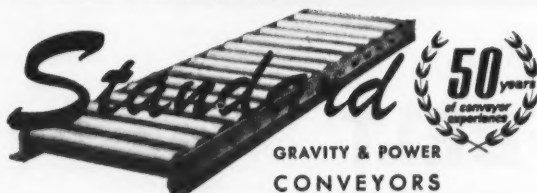
For details on Standard's complete line of gravity and power conveyors — permanent and portable — contact STANDARD CONVEYOR COMPANY, General Office: North St. Paul 9, Minnesota.



FAST, CONVENIENT SORTING is done off three conveyor lines consisting of Standard HANDIBELT powered units and gravity roller conveyors. At right, HANDIBELTS form conveying "bridge" under which terminal personnel and fork-lift trucks can easily pass.



Call the Standard representative listed in the yellow pages of your phone book or write direct for Bulletin 309. Address Dept. P-6.



Sales and Service in Principal Cities

Check 5731 opposite last page

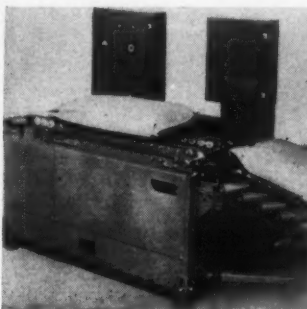
HANDLING & PACKAGING

**Case, bag weigher
provides accuracy
of 1/10 of 1%**

Uses: Unit automatically checkweighs cases, cartons, and bags from 20 to 100 lb.

Features: Accuracy of weighing device is 1/10 of 1% on products weighing 20 to 100 lb.

Description: Automatic case and bag checkweigher can handle up to 30 products per minute. Speeds and accuracies may vary in accordance with production rate, product



Automatic case and bag checkweigher handle products weighing 20 to 100 lb with an accuracy of 1/10 of 1%

dimensions, and accuracy required. Unit may be supplied with underweight and/or overweight rejection mechanism.

Power requirements are: 115 volts, 60-cycle, 1000 watts, and air pressure of 60 to 150 lb per sq in at .1 cu ft maximum. Compressed air is used to operate rejector mechanism. Electrical construction is to NEMA 12 specifications.

(Selectrol Model 1250 is product of The Exact Weight Scale Company, 538 E. Town St., Columbus 15, Ohio.)

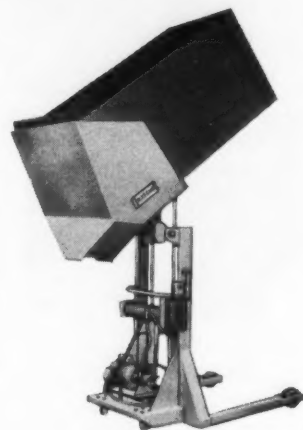
Check 5732 opposite last page.

Grader accessories

Illustrated four-page bulletin briefly describes accessories and attachments for manufacturer's motor graders. Bul MS-1161 — Construction Machinery Div., Tractor Group, Allis-Chalmers Mfg. Company, Milwaukee 1, Wisconsin.

Check 5733 opposite last page.

Now... a Powerful New TUBAR DUMPER Specially Designed for Bulk Chemical Containers



The new Tubar Twin-Cylinder Dumper is designed for all-purpose service in paint plants... pharmaceutical houses... granular plastics... and everywhere bulk chemicals are handled. It's built for years of rugged, heavy-duty service... cuts chemical container handling costs to the bone. Write for full information and operating specifications.

- Most models can be made portable
- Stops and holds loads at any point in dumping cycle
- Optional splash-proof and explosion-proof power features

UHRDEN is serving industry with a full line of all-purpose and special-purpose dumpers. Standard production models... or built to your specifications.



U-158-39A

Check 5734 opposite last page

CHEMICAL PROCESSING

**THAT'S
INTERESTING**

Smallest yet

Diode developed at the Pacific Semiconductors, Inc., will make possible a computer of pocket size or a radio no bigger than a single tube a half an inch in diameter.

"Tiny Tim" unit has a layer of glass-like substance that is bonded to surface of silicon rectifier. This micro-miniature diode can carry rectified currents up to 0.3 amp. Crystal is no smaller than that contained in conventional diode now used in industry.

Pump by heat

A pump using heat as source of energy has efficiencies that approach that of conventional steam engine. Movement of fluid is accomplished by heat generated vapor. Only very few moving parts are used with a simple check valve the most complex.

(Pump is made by Jet-Heet, Inc., Englewood, New Jersey.)

For more information on product at right, specify 5735 see information request blank opposite last page.



GAYLORD DETECTS

PACKAGE SAVINGS FOR YOU

Fast to find hidden clues to savings in packaging . . . that's your G-Man*. Just call him to the scene; he'll pick up the trail from there. He comes up with refreshing new solutions to protection, packing, shipping problems . . . with corrugated boxes.

Whether you need regular containers in big volume or specially engineered packaging, call in this modern Sherlock now. He's keen-eyed, ready—and nearby.

**Your Gaylord Man—of course*



GAYLORD

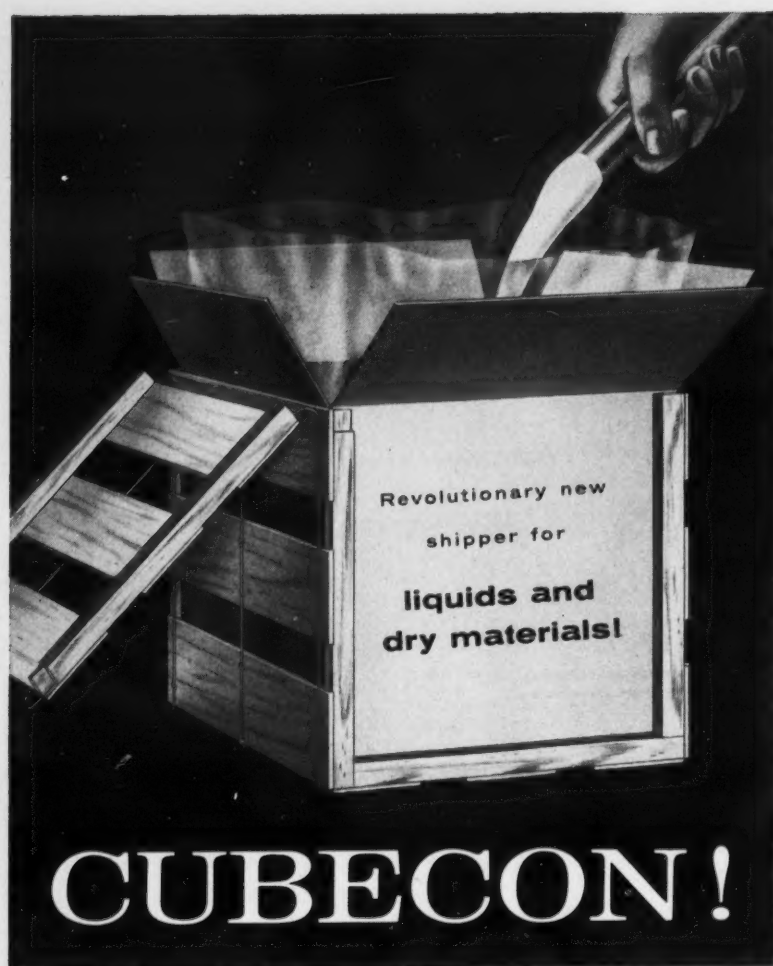
CONTAINER CORPORATION



HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

DIVISION OF Crown Zellerbach Corporation





Combines wirebound, corrugated carton and polyethylene liner

SAVES!

- ✓ Cost of Containers!
- ✓ Costly Shipping Space!
- ✓ Valuable Storage Space!
- ✓ Container Weight!

Now...save on costly drums and packing time by using MAXWELL'S CUBECON...a revolutionary new conception in lightweight, versatile, low-cost shipping containers. Purity guaranteed by perfectly scaled polyethylene liner; lightness and strength provided by the corrugated carton, tongue and groove cleats in the wirebound outer container strengthen CUBECON for stacking and shipping.

Our company has a multi-plant operation and 45 years' experience in the manufacture of corrugated, wirebound and plywood shipping containers. We can serve your needs and save you money!

Let us quote Cubecon on your requirements

MAXWELL BROTHERS, INC.

GENERAL OFFICES: 2300 South Morgan Street • Chicago 8, Illinois

SOUTHERN SALES OFFICE: P.O. Box 242, Macon, Georgia

PLANTS: Chicago, Illinois • Albany and Macon, Georgia • Jasper, Florida

Check 5736 opposite last page

MATERIAL HANDLING and PACKAGING



▲ With magnesium mobile loading ramp, Witco Chemical Co. can easily load or unload by lift truck from ground-level when all existing dock facilities are occupied, or at buildings where no docks exist

◀ Lightweight loading ramp can be moved easily from one location to another, either by lift truck or by two men

Instead of building dock facilities for loading and unloading box cars, Witco Chemical Co. purchased a mobile loading ramp and . . .

eliminates new dock construction, reduces shipment handling

GEORGE V. MICHAEL
Assistant Editor

With **R. W. SEMLER**
Midwest Traffic Manager
Witco Chemical Co.
Chicago, Illinois

essary to have two men unload by placing bags on pallets, and a lift truck would carry pallets to warehouse. To make shipments, procedure would be reversed.

If dock facilities were available, Witco could receive and ship unitized loads, having all handling done by lift trucks.

Problem: At the Chicago plant of Witco Chemical Co., absence of box car dock facilities resulted in 20 man-hours per car being spent to unload or load loose bags.

Consequently, it was nec-

Solution: Instead of building the dock, Witco purchased a 36-ft long mobile loading ramp. This lightweight (it is made of magnesium) loading

ramp provides a movable loading dock for ground-level shipping and receiving.

Although ball-bearing, wheel-mounted ramp can be maneuvered easily by one man, usually two men move it from one location to another. For longer distances, it is moved by lift truck.

Once ramp is spotted to carrier (truck or rail car), it is elevated to floor height via hydraulic lift. This is accomplished with a hand lever located on side near wheel. This automatically takes the load off the wheels. A positive safety lock locks ramp securely to freight car or trailer. A spring loading chain maintains positive, secure attachment during loading operations.

Ramp's width of 70 inches easily accommodates medium-capacity lift trucks carrying palletized loads of bags, cartons, or drums. Witco uses two drum-loading methods — palletized and with lift-truck, drum-clamp attachment. Ramp's rated capacity is 16,000 lb.

Results: Acquisition of mobile loading ramp eliminated building dock. Cost of ramp about equalled cost of one dock. In addition, if built, dock maintenance costs would have been incurred. Maintenance costs on ramp have been nil. Witco estimates ramp has paid for itself in six months.

Man-hours per car have been reduced from 20 to 4 through shift to lift truck loading and unloading unitized loads.

In both loading and unloading operations, ramp has proved to be a boon when all existing warehouse docks are occupied. Ramp is used on trucks or box cars in the immediate yard area, thus eliminating waiting for available dock space to load or unload. It is also being used at other buildings where no dock facilities exist.

("Magliner" mobile loading ramp is manufactured by Magline Inc., Pinconning, Michigan.)

Check 5737 opposite last page.



**SAVES TIME...
SAVES MONEY
IN SHIPPING AND
DISPENSING
CORROSIVE AND
HARD-TO-HOLD
LIQUIDS**



Splash Free Pouring! Polyethylene Flex-spout is shipped loose, attached after filling, provides splash free pouring.

Recessed Spout, Tamper Proof Seal! Spout recesses, is covered with tamper-proof seal during shipping and storage.

Tested Leakproof! Polyethylene bags are air-tested for leakage before and after insertion in pail.

Safe, Fast Dispensing! For corrosive liquids, dispensing pump is available, assuring safe, no-waste dispensing.

CONTINENTAL *Liqui-Liner*

A PACKAGE WITHIN A PACKAGE! Liqui-Liner is a five-gallon container fitted with a leakproof polyethylene bag, assembled by Continental, and shipped to the user with cover crimped on ready for filling through spout opening.

PRECISION-MADE FOR POSITIVE PROTECTION. Liqui-Liner assures positive protection for products which are corrosive or have a low iron tolerance. Heavy gauge steel container provides maximum protection against shipping damage. Custom-tailored bag fits container exactly, protects against product contamination and leakage.

SUBSTANTIAL SAVINGS! Liqui-Liner reduces shipping and handling costs! No outer carton is needed. Larger capacity means fewer containers can be used. Wide spout hole makes filling fast and easy. Recessed spout permits stacking; wire bail handle assures easy carrying.

PACKAGING CONVENIENCE AND ECONOMY! Dispensing is easier with Liqui-Liner—from dispensing pump or splash free spout. Large, smooth surface accommodates attractive lithography for permanent advertising. The empty steel container has utility use after original content has been used.

IF YOUR PRODUCTS require low-cost Liqui-Liner protection, call your nearest Continental representative for complete details.



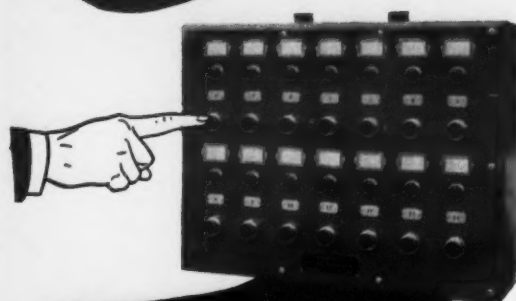
**CONTINENTAL
CAN COMPANY**
Eastern Division: 100 E. 42nd St., New York 17
Central Division: 135 So. La Salle St., Chicago 3
Pacific Division: Russ Building, San Francisco 4
Canadian Division: 5595 Pare St., Montreal, Que.

Check 5738 opposite last page

NOW

PUSH BUTTON CONTROL

FOR DISTRIBUTION OF DRY BULK MATERIALS

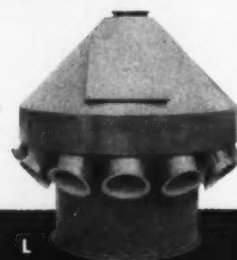


HS Electric Distributor

Do you ever wonder if your distributor is set on the right bin? The new FOOL-PROOF Hayes & Stolz Electric Distributor removes all doubt by signalling accurately your loading position at all times. Position can be changed only by a numbered push-button on the control panel, assuring positive selection. The new H & S Electric Distributor can be fitted with 5 to 20 openings. The diameter of these openings can be specified in 6", 7", 8" 10" and 12" sizes. Adaptable to mounting on elevator legs, collectors, sifters, mixers, screw conveyors and belt conveyors.

CAN BE CUSTOM-BUILT IN ALL SIZES TO FIT YOUR PLANT NEEDS

Extra monitor panels are available to allow for check on settings from anywhere in your plant.



Engineered with care and fully backed by **HAYES & STOLZ WARRANTY**

Hayes & Stolz

INDUSTRIAL MANUFACTURING CO., INC.

3521 HEMPHILL ST.

P. O. Box 11217

Fort Worth, Texas

Check 5739 opposite last page



LIGHT BUT SO STRONG!

TOTELINE FIBERGLASS TRAYS

For Drying: CHEMICALS PHARMACEUTICALS ANTIBIOTICS

They're feather-light, but they're durable and sturdy as any trays you've ever used! What's more, the large inside corner radii makes them very easy to clean. And, because fiberglass does not absorb heat, the materials dry faster in Toteline trays. Many sizes available. Write

TOTELINE
Wherever materials are handled

MOLDED FIBERGLASS TRAY CO.

World's largest producer of Fiberglass reinforced resin trays. Toteline

LINESVILLE, PENNSYLVANIA

Check 5740 opposite last page



OFF THE SHELF DELIVERY
from the greatest lineup of plastic jars and vials available anywhere

Polystyrene, acetate, butyrate and polyethylene jars and vials for:
Electronic components... Small machine parts... Tools... Powders and hundreds of other purposes

They'll protect your product from moisture, contamination, dirt. Shatterproof Clearsite vials are easy to label or print in 1 to 5 colors. Tell us what you want to package and we'll send you free samples and literature. Address Dept.G.

CELLUPLASTIC CORPORATION

Sales Office: Newark 5, New Jersey

Check 5741 opposite last page

HANDLING & PACKAGING

Infrared leak detector catches minute leaks within four seconds

Detects nitrous oxide concentrations to 20 ppm

Uses: For detecting leaks in packaging systems such as aerosol containers and other systems of atmospheric pressure.

Features: Utilizing an infrared principle to detect nitrous oxide gas, unit detects concentrations of down to 20 ppm full-scale within four seconds.

Description: Detector consists of proven infrared gas



Leak detector utilizes infrared principle to detect nitrous oxide gas down to 20 ppm with full-scale within four seconds

analyzer plus an integral sampling system with pump and standardizing gas cylinder mounted in a grey hammer-tone steel console. Pistol-type probe is attached to the console by a thirty-foot cable, making possible leak measurements in areas remote from the instrument.

In operation, nitrous oxide gas is introduced into the system being checked. Probe is passed over the area being checked and the leaking gas together with the surrounding atmosphere is drawn into the analyzer. When a pre-set limit is exceeded, two alarm meters indicate the presence of the leak and the concentration of nitrous oxide gas. One of these meters simultaneously activates a red alarm light located on top of the probe grip. Built-in connections make possible the use of an audible alarm.

A standardizing switch is built into the probe for controlling the flow of nitrous oxide gas into the detector for

HANDLING & PACKAGING

instrument standardization. By squeezing the probe trigger, the sampling system may be quickly flushed with atmospheric air. This leak detector does not require a cold trap for its operation, nor does it become easily contaminated.

The console measures 48½ x 22 x 17". It is mounted on casters for mobility and is fitted with eyebolts for use in overhead suspension. Front and rear doors allow accessibility from either side and include key locks. Two windows in front door permit reading of both alarm meters.

(Infrared-type leak detector is product of Process Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

Check 5742 opposite last page.



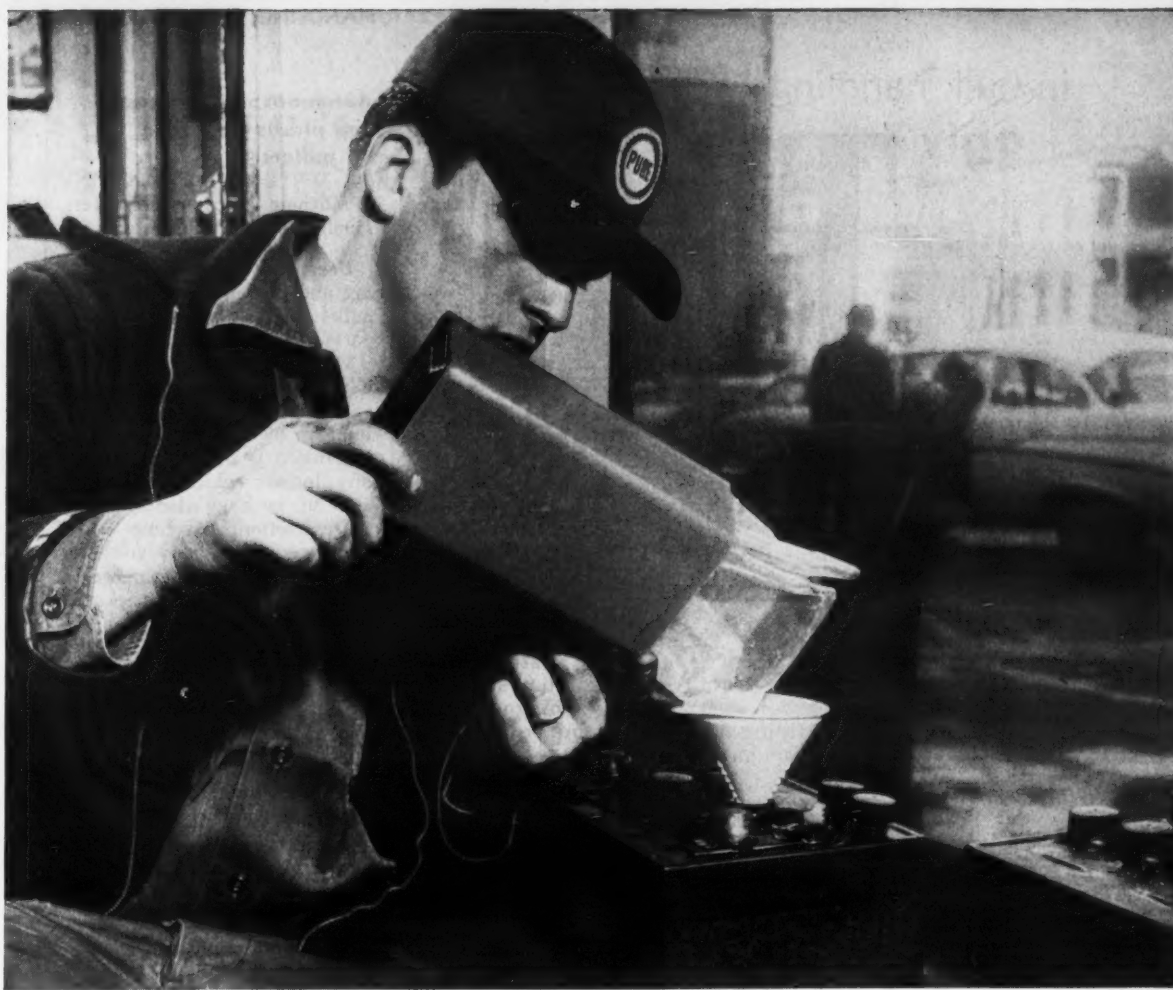
Big carrying capacity . . .

. . . is feature of industrial truck which has ability to carry 3000 lb in an 18-cu-ft hopper or when used as a platform carrier. As a fork lift (at 15" load center), truck will raise 1500 lb to 7'. Operator can tilt the fork-lift mast 10° back — 2° forward.

When carrying full load, truck can climb 25 percent grade. It can turn in an 84" radius as a fork lift and 82" radius if equipped as hopper or platform carrier.

Direct drive to power-flow transmission eliminates shifting, reduces vibration, and permits a 12-mph forward or reverse speed. Truck has low relative weight (only 1175 lb as a hopper carrier) and high maneuverability. R-18 Moto-bug is product of Kwik-Mix Co., Div. of Koehring Co., Port Washington, Wis.

Check 5743 opposite last page.



How to ship battery acid in a cardboard box!

Battery manufacturers have long known of the economics to themselves and dealers of shipping dry charged batteries. Now, thanks to VISQUEEN "L" film, this is an accepted method.

The "L" film, made only by VISKING Company, and first used in the Navy's stratosphere balloons, is as pinhole free as a polyethylene film can be. It made the perfect liner for cardboard packages designed to contain exactly the right amount of acid for a given battery.

Result—acid shipped at minimum cost and loss. When

the acid is added to the dry charged battery it is in perfect condition and fully charged at the moment of sale.

If yours is a difficult product to store or ship, VISQUEEN "L" film may be the answer. But be sure you get VISQUEEN film. Don't be fooled. No other film is as uniform, as free from thin spots and blemishes, as VISQUEEN film.

Write for full information about VISQUEEN film and your product, or use the Information Request Tag.



VISQUEEN film—the first and foremost polyethylene film. A product of the long experience and outstanding research of **VISKING COMPANY** Division of **UNION CARBIDE** Corporation
P. O. Box 1410, Terre Haute, Indiana.

In Canada: **VISKING COMPANY DIVISION OF UNION CARBIDE CANADA LIMITED**,
Lindsay, Ontario.

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Check 5744 opposite last page

in bulk handling
only

TOTE SYSTEM*

offers every one
of these important
advantages

Tote System is a complete, mechanical, automatic bulk handling system. It is based on metal bins—aluminum, stainless or carbon steel, monel, or magnesium—plus filling and discharging equipment. Here is what it will do:

1. Tote System effects important economies by eliminating recurring container costs; eliminating product loss, contamination and deterioration; reducing labor and handling costs; reducing warehouse storage space requirements; and preserving original product quality.
2. Tote System handles a diverse list of products, including liquids, both in-plant and inter-plant.
3. Tote System speeds up weighing and blending operations, accurately and automatically.
4. Tote System permits you to weigh incoming materials as a check against invoice weight, and for a permanent inventory record.
5. Tote System permits the use of a minimum, uncomplicated conveyor system with an accompanying reduction in clean-up and maintenance time.
6. Tote System, in handling food products, meets the requirements of all existing sanitation codes.
7. Tote System permits complete transportation flexibility. Tote Bins can be shipped by rail** or truck, or they can be left in the plant and filled from hopper cars or trucks.
8. Tote System can be adapted easily to future requirements. Plant layouts can be changed simply by re-locating discharge stations. Operations can be expanded merely by procuring additional Bins. And Bins can be used interchangeably for different products.
9. Tote System, in small and medium sized installations, requires no more labor to operate than a fixed storage bin system. In extremely large installations, another man may be required, but, in most cases, his time is more than offset by the elimination of highly-paid electronic experts needed to maintain and operate complicated fixed bin storage and conveying systems.

**CONTAINER CAR

Railroad Container Cars with either 26 or 28 Tote Bins on a car are available on lease arrangement. One man can unload the car in 35 minutes, using a lift truck. A mileage allowance of 3.7 cents is paid for every mile this car travels.

*TOTE AND TOTE SYSTEM
REG. U. S. PAT. OFF.

Why not let our engineers survey your plant at no obligation?
Meanwhile, write for new catalog containing complete details.

TOTE SYSTEM, INC.

680 SOUTH 7th, BEATRICE, NEBR.

Check 5745 opposite last page

HANDLING & PACKAGING

**Automatically arranges
and places packages
on pallets**

Machine loads in pre-determined pattern and quantity

Uses: Automatically arranging and placing packages on a pallet in a pre-determined pattern and quantity.

Features: Self-contained unit handles conventional seven-case pattern at rate of approximately 39 cases per minute. Operation is such to eliminate any impact which might result in package damage.

Description: Machine takes packages from conveyor line and arranges them in rows to fit pallets. Rows of packages are then placed on pallets until layer is formed. Pallet drops down to allow another layer to be formed.

After pre-determined quantity is placed on pallet, unitized load is conveyed out of machine.

(Series 300 Pallet loader is manufactured by Alvey Conveyor Manufacturing Co., 9301 Olive St. Rd., St. Louis 24, Missouri.)

Check 5746 opposite last page.

Heavy-duty excavator

Bulletin of four pages describes heavy-duty excavator and shows job applications. Heavy-duty excavator bul — Koehring Division, Koehring Company, 3026 West Concordia Ave., Milwaukee 16, Wis.

Check 5747 opposite last page.

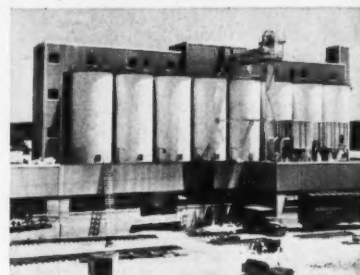
Self-contained, mobile unit is sifter-conveyor combination

Uses: For sifting and conveying fine powdered materials to mixers or storage bins.

Features: Sifter-conveyor combination is incorporated into one self-contained, mobile unit. It can be mounted on casters for moving from one operation to another. Tubular construction makes all parts easily accessible for cleaning.

Description: Essentially,

SAVE
with a MARIETTA
STORAGE SYSTEM
Engineered to your
own needs



MARIETTA STORAGE SILOS can be tied in with plant construction for efficient processing of materials.

• You'll realize a big savings in time, money and materials when you install a modern Marietta Storage System.

Sturdy, interlocking concrete stave silos save materials by keeping them dry, free from waste, protected against weather or fire. And there's practically no maintenance to Marietta storage silos.

Conveyors, feeders, discharge systems or other specially designed equipment save material handling time and speed-up your operation. Whatever bulk material you use, you can depend on Marietta's know-how to design and erect the most efficient system for your need. The complete job will be handled under one cost-saving contract or in cooperation with your engineering staff, consultants or contractor.

Write today for an analysis of your storage problem and ask for a copy of the Marietta Industrial Storage Systems Booklet.

42 Years Know-How in Precast
Concrete Construction

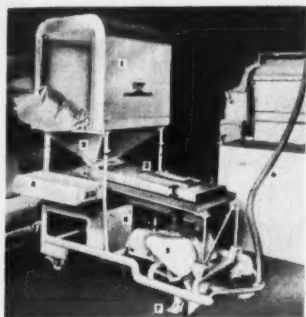
THE *Marietta*
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Nashville, Tenn.

Check 5748 opposite last page

CHEMICAL PROCESSING

HANDLING & PACKAGING

unit consists of a dump bin, a Ro-Ball sifter, and a pneumatic conveyor. One push-button operates entire system.



Parts of the system, numbered in the above illustration, are as follows:

1. Stainless steel cover
2. Stainless steel dump hopper
3. Ro-Ball sifter
4. Bag rest
5. Aerating chamber
6. Conveyor tube
7. Casters and floor locks
8. Self-container air supply

Unit can sift and convey in excess of 100 lb per min, for distances to 175 ft. If desired, it can be operated from plant air supply.

(Ro-Ball Airmatic is manufactured by The J. H. Day Co., Div. of The Cleveland Automatic Machine Co., Cincinnati 12, Ohio.)

Check 5749 opposite last page.



"Hereafter, please remember that we sales-ladies refer to ourselves as 'modistes', and not as 'packaging engineers'!"

It's easier to solve
your conveying problems
with

DIAMOND Conveyor Chain

DIAMOND Conveyor Chain's high operating efficiency, precision and versatility make it ideal for conveying and automated operations of all types.

Conveying and synchronizing problems—such as automatic assembly, filling, packaging and folding—are speedily solved by DIAMOND Chain's uniform pitch and smooth action. A wide range of extended pins and attachments permits almost any interval or sequence set-up desired.

For conveying, lifting and transporting—DIAMOND'S toughness, efficiency and long service life help reduce operating and service costs, minimize maintenance.

Where corrosion or product contamination is a problem—DIAMOND Stainless Steel Conveyor Chain supplies the answer.



STRAIGHT ATTACHMENT—one side



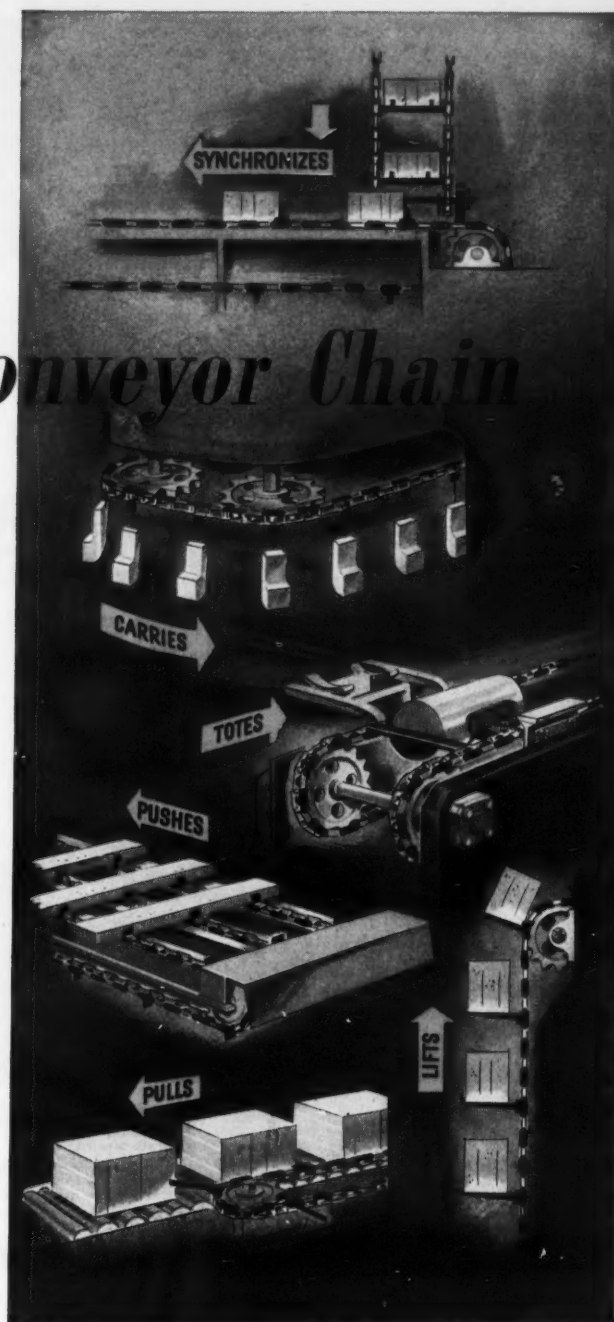
BENT ATTACHMENT—both sides



BENT ATTACHMENT—one side



EXTENDED PIN—one side



● Your nearby DIAMOND Distributor can supply all types of conveyor chains and sprockets, plus expert engineering assistance to solve special conveying problems. Look under "Chains" or "Chains, Roller" in the YELLOW PAGES . . . or write to factory for Conveyor Catalog and name of your nearest Distributor.

DIAMOND CHAIN COMPANY, INC.

A Subsidiary of American Steel Foundries

402 KENTUCKY AVENUE, INDIANAPOLIS 7, INDIANA

Offices and Distributors in All Principal Cities

Check 5750 opposite last page

HOPPER and TANK SCALES

HOPPER SCALES. For batching, charging, proportioning, filling, compounding and processing. Capacities from 500 to 120,000 lbs. For square, rectangular or cylindrical hoppers. Howe lever action assures rugged and accurate service.

TANK SCALES. For all types of tanks mounted vertically or horizontally. Simplified pipe lever system for supporting and weighing all tank loads from 500 pounds to 110 tons. Low corner mounting stands permit easy installation in areas with low ceilings or limited floor space.

WEIGHT CONTROL IS COST CONTROL

Fractions of pounds can be critical in cost and product quality.

Howe hopper and tank scales can give you rapid, accurate mixing and weighing of any group of materials. You can have any type of weight indication you choose—dials or Weightographs for direct readings, Mechanoprint recorders for printed weights, remote printers for centralized weighing, digital readouts and many other special types. And Howe understructures are the proud product of 100 years of skilled scalesmanship.

Additional scales—or better scales—might help your profit picture right now. Find out by talking to the man from Howe.

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Complete Details

HOWE

THE HOWE SCALE CO. • RUTLAND, VERMONT
A SUBSIDIARY OF SAFETY INDUSTRIES, INC.

Check 5751 opposite last page

HANDLING & PACKAGING

Tractor-shovel features added dust-protection, increased capacity

Rubber-tired, front-end loader with rated carrying capacity of 2500 lb and incorporating many new design features has been added to manufacturer's line.

Short turning radius (6 ft to outside rear hub) permits it to be operated in and out of boxcars having 6-ft doors.

Power-shift transmission is full-reversing and has two speeds. Power-transfer differential automatically transfers more torque to drive wheel with best footing when slippage is encountered.

Large-diameter hydraulic brakes are automatically adjusted and are sealed against dust and dirt. Access panel at front of unit offers easy inspection and servicing of master brake cylinder.



Increased protection against dusts, and capacity are two of many features of new model front-end loader

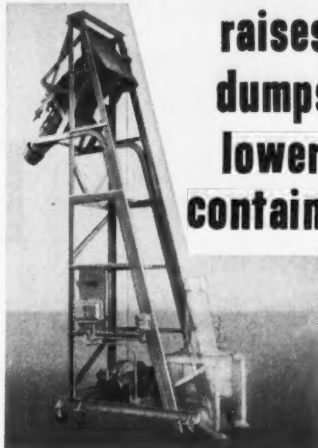
Unit is available with gasoline, diesel or LPG power. Fuel tank has sufficient capacity to permit full eight-hour operation with no need for refueling during any shift.

With breakout force of 4500 lb, unit with 20-cu ft bucket can handle maximum load of material weighing 125 lb per cu ft. Several buckets in various sizes are available so that average weight of material to be handled can be matched to carrying-capacity of 2500 lb. Maximum dumping height clearance is 5 ft 4½ in.

As protection against dust and dirt, engine is equipped with triple air cleaning system. Hydraulic system has replaceable oil-filter cartridge, and oil reservoir is an electrically welded, closed, pressure-

G-W PORTABLE DRUM DUMPER

**raises,
dumps,
lowers
containers**



... only 2 buttons to push!

Unloading full drums, barrels, or containers is easy with this simple rugged machine. Move it almost anywhere on its sturdy rubber casters. Then push the UP button to raise and empty a drum over a high vat edge; press DOWN button to return the carriage for a fresh load.

G-W Drum Dumpers can be "tailored" to meet your weight requirements. Specially designed carriages will handle any size and type of container.

Fully Automatic drum handling systems are one of G-W's materials handling specialties. Engineered for the needs of large or small plants, these systems can handle 30 to 40 containers an hour—through loading, unloading, washing and storage.

Mail the coupon below for your free copy of G-W's Idea Book on Materials Handling, plus details on modern drum handling methods.

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Makers of Conveying Systems and Equipment • Ice Handling Equipment
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Please send me complete details on the Drum Dumper, plus G-W's "Idea Book" on materials handling.

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Company _____
Address _____
City _____ Zone _____ State _____

Check 5752 opposite last page

CHEMICAL PROCESSING

HANDLING & PACKAGING

control type. Majority of all pivot points are sealed to reduce maintenance.

Both transmission and torque converter oil are cooled by engine radiator cooling system.

Interchangeable front-end attachments include pick-up sweepers, hydraulic grab devices, crane hook, tine buckets, scrap buckets, and blade snow plows.

(Model H-25 Payloader is manufactured by The Frank G. Hough Company, subsidiary of International Harvester Co., 744 Seventh Avenue, Libertyville, Illinois.)

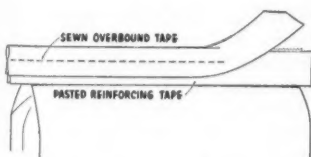
Check 5753 opposite last page.

Improved multiwall bag — gets stronger package costs savings

Uses: For packaging bulk materials.

Features: Reinforcing tapes make possible a reduction of at least 10% or more in the basis weight of the bag. This results in lower bag cost without any sacrifice in the bag's strength or performance.

Description: Improvement in open-mouth multiwall bag construction consists of reinforcing tapes which are fas-



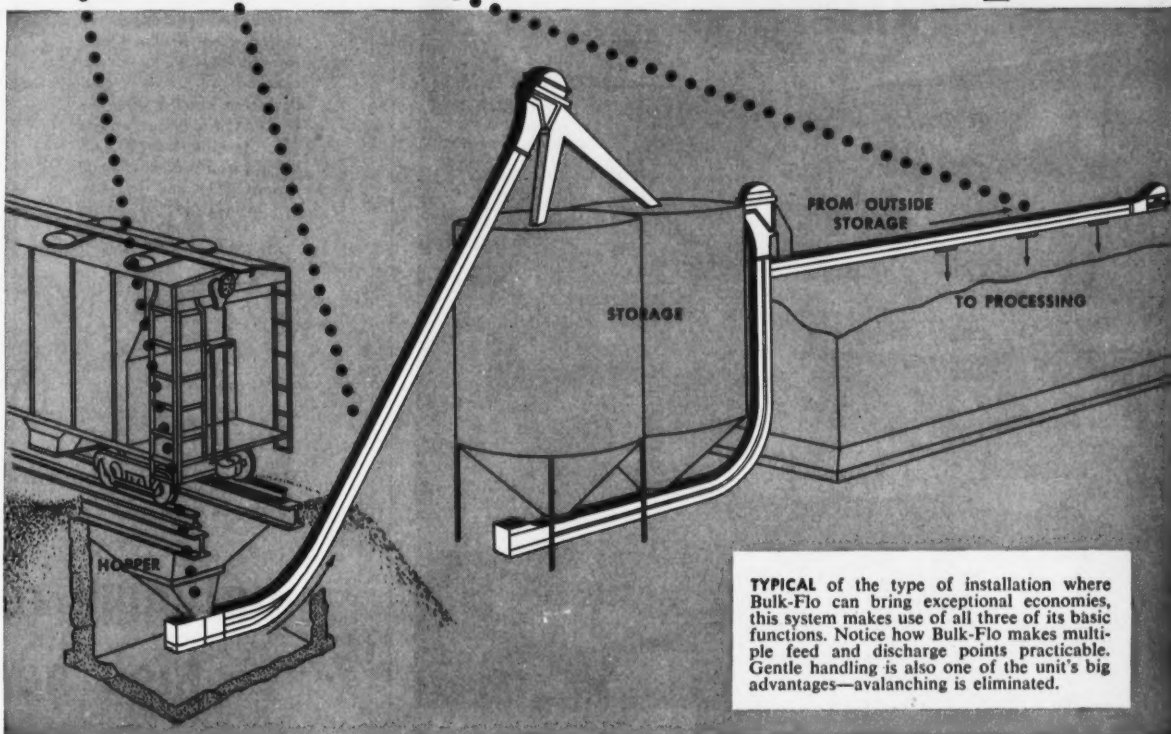
Reinforcing tapes serve to strengthen bag ends where most bag breakage occurs

tened to both ends of the bag at the sewing line. This reinforcement serves to strengthen the bag ends where most bag breakage occurs. Manufacturer reports that closure can be effected with any sewing head having a bound-over tape attachment.

("Sew-Strong" is development of Union Bag-Camp Paper Corp., 233 Broadway, New York 7, New York.)

Check 5754 opposite last page.

It's a feeder! It's an elevator! It's a conveyor!



It's 3 units in 1! And LINK-BELT Bulk-Flo works equally well fully or partially loaded

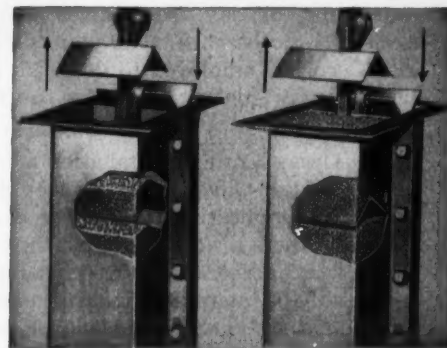
WITH its remarkable ability to combine horizontal, vertical and inclined travel . . . to feed, convey and elevate using a single drive—Link-Belt Bulk-Flo is industry's most versatile medium for handling non-abrasive, non-corrosive materials. In fact, it often replaces several units—in less space and at lower cost.

Bulk-Flo will bring you the tremendous savings it has brought to so many other plants. Let a representative at your nearest Link-Belt office give you an unbiased answer. Or write for Book 2475.



BULK-FLO FEEDERS • CONVEYORS • ELEVATORS

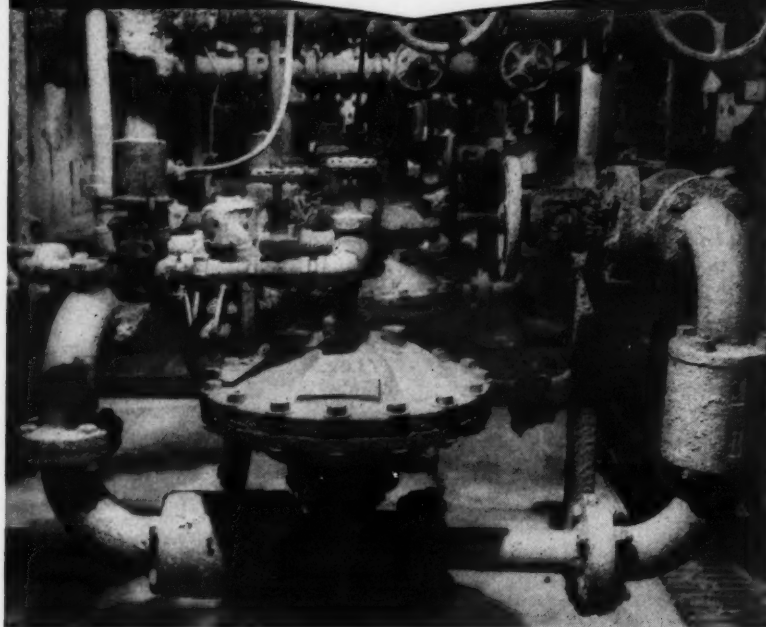
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarborough (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.



SOLID FLIGHTS permit Bulk-Flo to operate independently of internal pressure. Thus, it needn't be loaded to full capacity in order to provide positive movement of material. Speed is constant—capacity can be varied by merely regulating amount of feed. And regardless of load, Bulk-Flo is self-clearing.

Check 5756 opposite last page

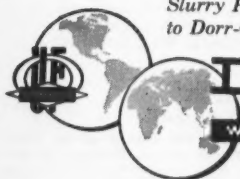
Solved... Another "Problem Pumping" Job at Owens-Corning Fiberglas



Handling water base paint and operating 16 to 24 hours per day . . . every day, these Oliver Diaphragm Slurry Pumps installed at the Newark, Ohio plant of the Owens-Corning Fiberglas Corp. are employed to maintain pressure in the paint feed line to spray gun manifolds for the spraying of acoustical tile block.

The Owens-Corning installation is but another example of the ability of Dorr-Oliver Pumps to provide the solution to "problem pumping" applications. With the diaphragm operating pneumatically there is *no stuffing box*, thus *no leakage*. The reliability and low maintenance features inherent in this link-free design can readily be interpreted in terms of reduced operating costs. In addition, the O.D.S. is capable of handling materials ranging from clear liquid to slurries containing up to 60% abrasive solids.

For a free copy of Bulletin No. 5003 covering the Oliver Diaphragm Slurry Pump, just drop a line outlining your particular problem to Dorr-Oliver Incorporated, Stamford, Connecticut.

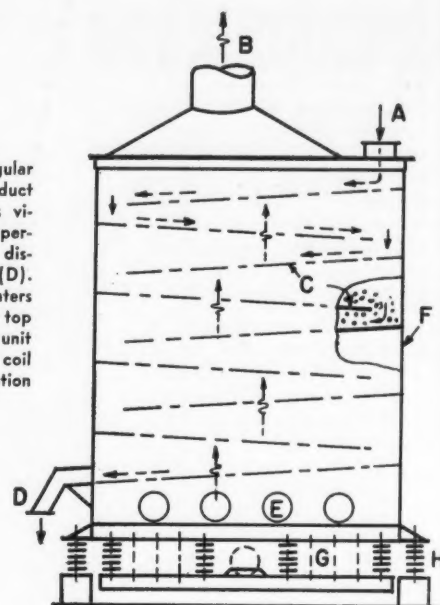


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Check 5757 opposite last page

cp PROCESSING EQUIPMENT

Side view of rectangular tray dryer-cooler. Product enters (A) at top; is vibrated down declined perforated trays (C) and discharged at bottom (D). Drying or cooling air enters (E) and discharges at top (B). Steel housed (F) unit is mounted on drive coil springs (G) and isolation coil springs (H).



Vertical natural frequency dryers,
coolers, and heaters offer . . .

optimum retention time, high heat transfer

Uses: Vertical heating, cooling, and drying granular products such as ammonium nitrate, pelletized dynamite, ammonium sulfate, and flake caustic.

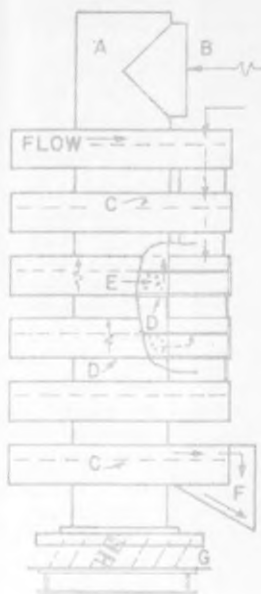
Features: Vertical vibrating heat transfer units require minimum floor area, do not create fines, are dust-proof, screen while conveying, and offer methods for continuous

sampling. Optimum retention times and high rates of heat transfer are characteristic with this equipment.

Natural frequency principle, which uses coil springs to store energy, results in low-stress, low-hp operation.

Units are built for direct heat transfer using air and products of combustion, or indirect heat transfer using

Operating Data on Vibrating Dryer-Coolers			
Operating Characteristics	Rectangular Tray	Circular Tray	Standard Spiral
Material Movement	Downward	Downward	Upward
Max. Capacity, tons/hr	25	15	4
Retention Time, min	180	40	25
Unit Size	20' high 4' x 10' tray	15' high 24" wide trough	25' high 12" wide trough
Temperature Limitations	500°F Air 650°F Material	250° Air 350° Material	250° Air 200° Material



Side view of circular tray dryer-cooler. Product enters top and is vibrated in circular direction around perforated tray (C) in flight (D) to hole where it drops to flight below to final discharge (F). Air enters (B) and is vented through holes in center tube (A) at each flight (E). Unit is mounted on spring assembly and drive base (G).

water sprays under flights carrying material. Combination units utilizing both direct and indirect heat transfer have also been designed, using water and air for cooling.

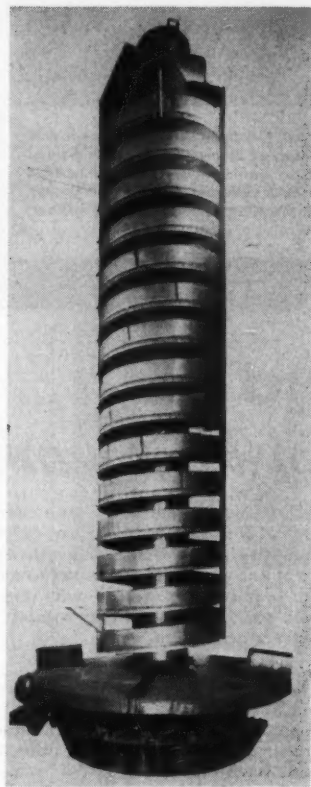
Description: Three different types of units are offered. In addition to standard spiral elevator-dryer-cooler, circular and rectangular units have been developed to obtain higher capacities and longer retention times. They are constructed of either mild or stainless steel.

Accompanying table lists specific features of each of these units.

Standard spiral elevator is mounted on coil springs sloped at approximately 30° to horizontal. Vibration of spiral has combination lifting and turning motion causing material to vibrate uphill on helical trough.

Circular tray dryer-cooler is mounted on a similar spring system. However, material is

fed to top of unit. Rather than having helical flight, circular trays are mounted at right angles to axis of center tube. Material is vibrated with circular movement around flight and, as it approaches starting point, dropped through hole in



Standard spiral uses helical trough on which material will climb up-hill due to lifting-twisting motion of unit

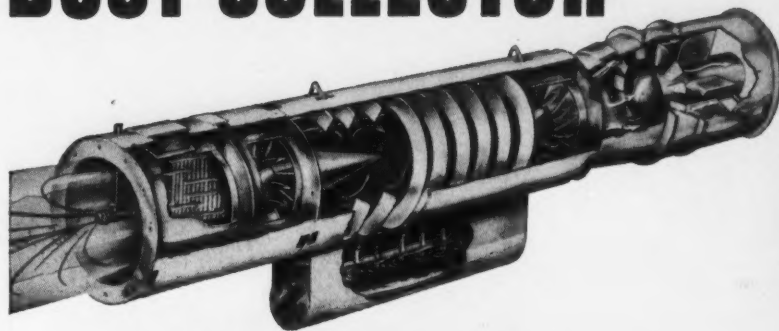
base to flight below. Cycle is repeated until material is discharged at base of unit.

Rectangular tray dryer-cooler is mounted on coil springs parallel to center line of unit. Machine vibrates with short stroke in a vertical plane. Troughs or trays are declined, and material fed to top of unit vibrates slowly down trays, spilling from one to another until discharged at bottom of unit.

(Spiral, circular tray, and rectangular tray natural frequency dryer-coolers are manufactured by Carrier Conveyor Corp., 211 N. Jackson St., Louisville 2, Ky.)

Check 5758 opposite last page.

PROVED NEW JOY-MICRODYNE DUST COLLECTOR

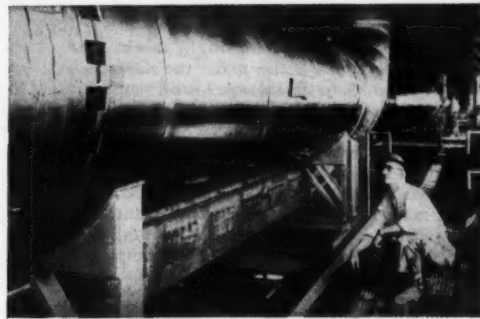
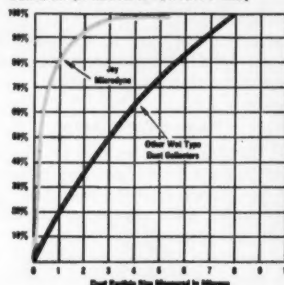


PROFILE OF A PROBLEM SOLVER

Here is an in-duct "educated pipe" that laughs at space, weight and water limitations as it collects over 99% of dust 5 microns and larger; 92% of 2-micron dust, and substantial amounts of smaller dust.

Particles enter through water-saturated air, slam against a water-film-covered impingement element, encase themselves in water droplets as they pass through, then whirl and collect on the sides of the middle section, to finally drain into a sump. Cleaned air is straightened and thrust on its way by an integral Joy Axivane Fan.

Performance graph of actual installation shows efficiency of the Joy Microdyne Dust Collector. (A micron is 1/25,000 inch)



This 48,000 cfm installation shows space economy of in-duct placement.

SAVES SPACE—Installs as an integral section of duct-work; requires only 1/10 to 1/20 the space of conventional units. 2500 cfm unit is 10 feet long; just 15 inches in diameter.

SAVES WEIGHT—Even the largest unit 64,000 cfm, 5 feet in diameter, 32 feet long—weighs only 6,500 pounds . . . or 1/5 the weight of conventional collectors. 2,500 cfm unit weighs only 325 pounds.

SAVES WATER—The largest Joy collector requires only 48 GPM flow—much less than comparable wet collectors. Add a Delpark Filter (Sold by Joy) and water

can be recirculated to recover valuable dusts. The filter also reduces water borne solids to give a dependable, clear water supply from a dirty water source.

SUCCESSFUL INSTALLATIONS—

Joy collectors from 500 cfm through 64,000 cfm are now in use collecting such widely varied dusts as hematite, copper and uranium ores, coal, quartz, limestone, phosphate, stainless steel and titanium carbide grindings. For answer to your dust collecting problems, write, wire or call: Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

WRITE FOR FREE BULLETIN 227-80

JOY ... EQUIPMENT FOR INDUSTRIAL PLANTS ... FOR ALL INDUSTRY



Conveyors



Industrial Compressors



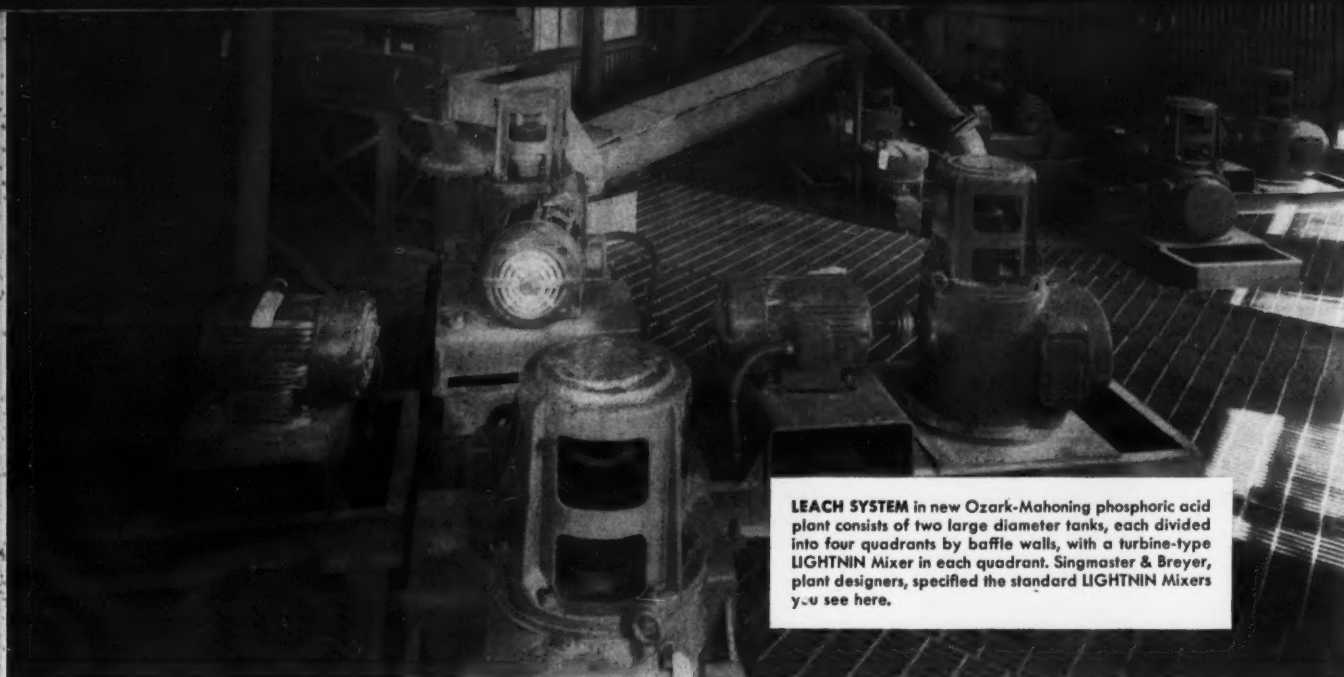
Electrical Connectors



Fans and Blowers

WWW 1-6083-227

Check 5759 opposite last page



LEACH SYSTEM in new Ozark-Mahoning phosphoric acid plant consists of two large diameter tanks, each divided into four quadrants by baffle walls, with a turbine-type LIGHTNIN Mixer in each quadrant. Singmaster & Breyer, plant designers, specified the standard LIGHTNIN Mixers you see here.

YOUR OPINIONS —

— and comments on the significant subjects carried in each month's **CHEMICAL PROCESSING** are important! We **WELCOME** your letters expressing your views. Many CP readers are taking the opportunity to state their views on today's top questions.

By Publishing your letters in **CHEMICAL PROCESSING** others will have the opportunity of hearing your side.

Perhaps you agree

with what has been written in these articles.

Maybe you don't.

You might even have a thought or angle which wasn't expressed.

If so, why not let us and others hear your ideas? Suitable letters will be published in our regular "Letters from Readers" column. (See page 15.)

Address your comments to:
The Editor
CHEMICAL PROCESSING
111 E. Delaware Place, Chicago 11, Illinois

For more information on product at left, specify 5760 see information request blank opposite last page.



New acid process gives 95% yield with good mixing in leach tanks

More often than you might think, *good mixing of fluids* can make the difference between "just average" and superior process results.

That's one reason why **LIGHTNIN Mixers** were specified for this new wet-process phosphoric acid plant at Ozark-Mahoning Company, Tulsa, Okla. Singmaster & Breyer, New York engineering firm, did the process and equipment design for Ozark-Mahoning Company.

High yield—low cost

Utilizing the Belgian Prayon process, relatively new to this country, the plant consistently yields better than 95% of acid containing 30% P_2O_5 . It produces a 32% product from sulfuric acid as weak as 55%.

Leaching temperature is 15-20 degrees cooler than conventional processes—easing the corrosion problem and per-

mitting the use of less costly materials of construction.

The new plant has run without a hitch since the day Ozark-Mahoning operating management pushed the button.

How mixers help

Good mixing does its job in the leach system, where finely ground phosphate rock is slurried with recycled phosphoric acid, then reacted with sulfuric acid to precipitate gypsum.

A **LIGHTNIN Mixer** in each of eight leach-tank compartments provides the exact balance of fluid flow and turbulence needed for intimate acid contacting and highest extraction values.

The **LIGHTNIN**s also provide complete uniformity and immediate dispersion of reactants, resulting in the growth of large, easily filtered gypsum crystals.

On *your* next project, why take chances on fluid mixing when you can be *sure*? With **LIGHTNIN Mixers**, you get the security of knowing there's a mixer to match your requirements *exactly*—with replacement parts always quickly available if you ever need them.

Predictable results

You're sure about *results*, too—because your **LIGHTNIN**s are selected on the basis of application and test data unique in industry. Many thousands of pilot runs, plus scientific methods of scale-up, insure predictable mixing results that are unconditionally guaranteed.

For quick, competent help in getting a new process started right, or in making an old process more efficient, call your **LIGHTNIN Mixer** representative. He's listed in **Chemical Engineering Catalog**. Or write us direct.

Lightnin® Mixers

MIXCO fluid mixing specialists

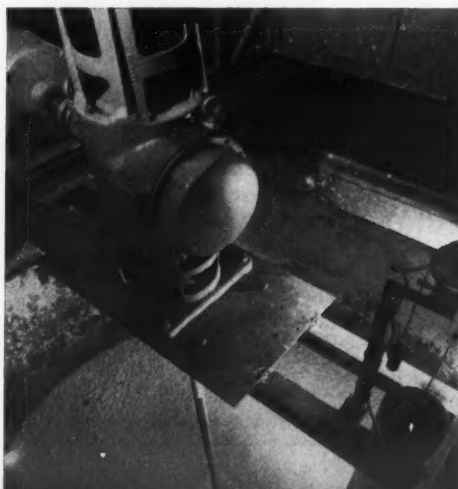
YOU CAN HANDLE any fluid mixing job, in tanks of any size or shape, with **LIGHTNIN Mixers**. Results are fully predictable; unconditionally guaranteed.

FOR LATEST MIXING INFORMATION and full description of **LIGHTNIN Mixers**, send for these helpful bulletins:

- | | | |
|--|--|--|
| <input type="checkbox"/> Top or bottom entering; turbine, paddle, and propeller types: 1 to 500 HP (B-102) | <input type="checkbox"/> Side entering: 1 to 25 HP (B-104) | <input type="checkbox"/> Quick-change rotary mechanical seals for pressure and vacuum mixing (B-111) |
| <input type="checkbox"/> Top entering; propeller types: ¼ to 3 HP (B-103) | <input type="checkbox"/> Laboratory and small-batch production types (B-112) | |
| <input type="checkbox"/> Portable: ¼ to 3 HP (B-108) | <input type="checkbox"/> Condensed catalog showing all types (B-109) | <input type="checkbox"/> Data sheet for figuring mixer requirements (B-107) |

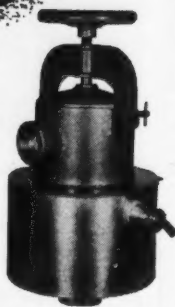
Check, clip, and mail with your name, title, company address to:

MIXING EQUIPMENT Co., Inc., 185-f Mt. Read Blvd., Rochester 11, N.Y.
In Canada: **Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 10, Ont.**



No one Wants
a Product
Contaminated
with Iron

Your best
reason for
installing



Pipeline
Ferrofilter

Magnetic Separators

There's no need to gamble with the purity and quality of your product. Frantz FERROFILTERS remove contaminating ferrous particles from liquids and slurries by magnetic action with a maximum of efficiency and a minimum of cost.

That is why hundreds of plants in the process industries are using them to improve their products; eliminate customer complaints; and increase their sales and profits.

Send for BULLETIN 16-E

Full information on installation and operation with tables of sizes and capacities to help select the proper type for your application.



TRY OUR RENTAL PLAN

Prove the efficiency of FRANTZ FERROFILTERS on your operation at low cost. Write for full details.

S. G. FRANTZ CO., INC.

Brunswick Pike & Kline Ave.
P. O. Box 1138 Trenton 6, N. J.

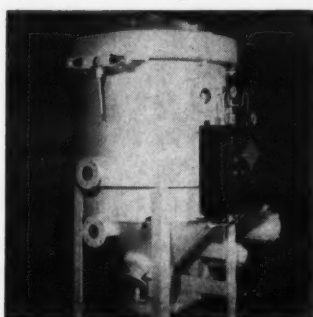
PROCESSING

Filter elements unwind,
extend filtration cycle
on automatic filter

Unit operates unattended for
weeks at a time

Uses: Filter is recommended for low-solids, high-clarity filtrations. It is ideal for long-cycle trap and polishing jobs, such as polishing beer, process water, and similar solutions.

Features: Controls automatically unwind filter media to expose clean filtering surfaces when pressure drop across filter reaches predetermined point. Unit operates fully automatically. Operator merely flips starting switch and returns days later without even periodically checking unit.



Units are available with 400- to
7500-sq-ft filter areas

mined point. Unit operates fully automatically. Operator merely flips starting switch and returns days later without even periodically checking unit.

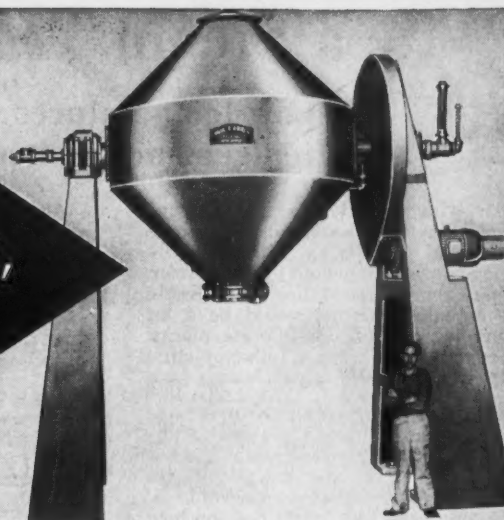
Description: Filter consists of a vertical pressure chamber containing a series of vertical filter elements arranged in a circular pattern.

The filter elements consist of a central, perforated core around which is placed a wound cartridge of non-woven fabric or paper. End of filter media from each cartridge is fastened to a central winder spool (see drawing). Winder is attached to power source located outside filter.

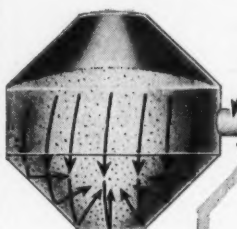
Liquid enters unit and flows through the cartridges, the solids depositing on outer surface of cartridges. Clarified liquid reaches core and is discharged from bottom into a common manifold arranged around periphery of chamber.

Controls are set so that when all cartridges are un-

For
QUICK,
COMPLETE,
EVEN
DRYING



use the Paul O. Abbé
ROTA-CONE VACUUM DRYER



The gentle agitation of the Paul O. Abbé Rota-Cone Vacuum Dryer gives the material quick, even, complete drying of the entire batch. No wet and dry spots can occur as with some other types of dryers.

So gently is the material agitated, that there is no contamination or degradation of even the most delicate materials. Yet the entire load is kept constantly in motion so it dries uniformly.

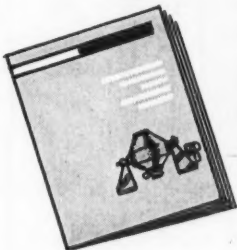
The Paul O. Abbé Rota-Cone Vacuum Dryer can also be used as a Cone Blender. You get the use of two machines for the price of one! The Paul O. Abbé Rota-Cone action produces a perfect blend.

The machine is easy to clean, since there are no agitators or baffles. There is no dust, since an internal filter is used.

The Paul O. Abbé Rota-Cone is safe. No poisonous or otherwise hazardous fumes can escape.

If you are not now using this Rota-Cone, your drying operations suffer.

Write us now for folder illustrating and describing in detail, the Paul O. Abbé Rota-Cone Vacuum Dryer. Just use the coupon below. No obligation.



Paul O. Abbé Inc.
402 Center Avenue, Little Falls, N. J.

Please send me illustrated folder describing in detail the Paul O. Abbé Rota-Cone Vacuum Dryer.

Name.....
Company.....
Street.....
City.....State.....

PAUL O. ABBÉ

402 CENTER AVENUE LITTLE FALLS, NEW JERSEY

Check 5762 opposite last page

Check 5761 opposite last page

Why a Steam Trap Has to Handle "Air"

Low temperatures and corrosion of equipment are often evidence of inadequate trap air venting capacity

Air, with its load of oxygen and carbon dioxide, has an unwholesome habit of interfering with the efficiency of steam heated units. If steam were always free of these undesirable companions, things would be a lot simpler for men-who-operate-plants. Because it isn't, three unhappy situations frequently occur:

1. Operating temperatures are subnormal. This is a two-part problem. First, an air-steam mixture has a lower temperature than pure steam at the same pressure—see Table A. Secondly, air can "plate out" on heat transfer surfaces as shown in Figure 1. Under some conditions, such an air film will knock down heat transfer efficiency by as much as 50%.

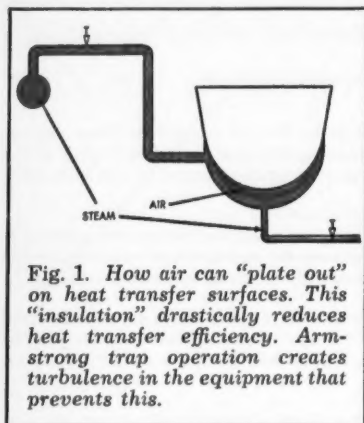


Fig. 1. How air can "plate out" on heat transfer surfaces. This "insulation" drastically reduces heat transfer efficiency. Armstrong trap operation creates turbulence in the equipment that prevents this.

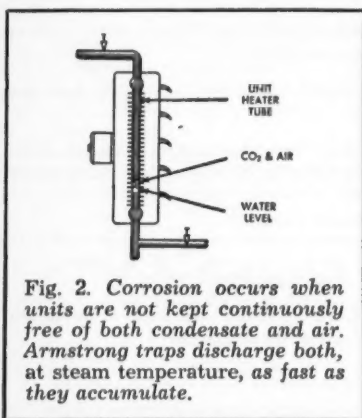


Fig. 2. Corrosion occurs when units are not kept continuously free of both condensate and air. Armstrong traps discharge both, at steam temperature, as fast as they accumulate.

2. Corrosion rears its ugly head. Oxygen and carbon dioxide are real trouble-makers. CO₂ gas goes into solution in condensate, forms carbonic acid and chews away at vulnerable metal sections. O₂ aggravates the situation. See Figure 2.

TABLE A—How air reduces steam temperature.

Gauge Pressure	Temp. of Steam with No Air Present	Temp. of Steam Mixed With Various Amounts of Air (% Air by Volume)	
		10%	30%
10.3	240.1	234.3	220.9
25.3	267.3	261.0	246.4
50.3	298.0	291.0	275.1
75.3	320.3	312.9	295.9
100.3	338.1	330.3	312.4

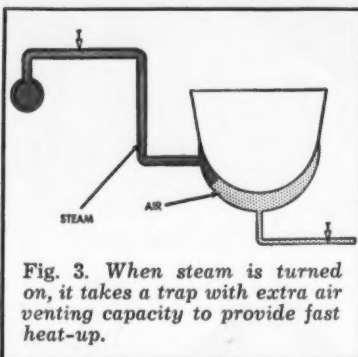


Fig. 3. When steam is turned on, it takes a trap with extra air venting capacity to provide fast heat-up.

3. Heat-up is slow as a snail. Air has a picnic in units that are shut off periodically. Figure 3 pictures the problem. Lines and equipment literally fill up with air. When the steam is turned on it can get in only as fast as the air gets out.

Enter Steam Traps

Curing these steam system ailments involves an operation sometimes called a "trap transplant." It consists of removing traps that don't get the air out and replacing them with traps that do.

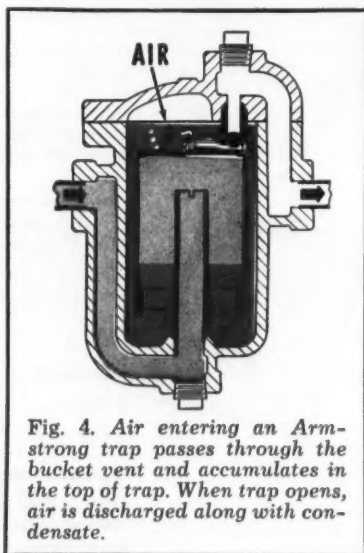
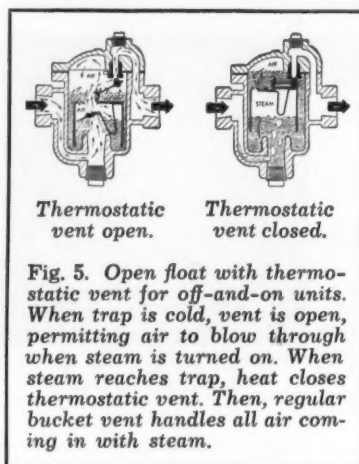


Fig. 4. Air entering an Armstrong trap passes through the bucket vent and accumulates in the top of trap. When trap opens, air is discharged along with condensate.

Figure 4 shows how an Armstrong inverted bucket trap continuously vents air. What the picture doesn't show is a built-in plus-value of this trap's design. An Armstrong trap opens suddenly, creating a momentary pressure drop and turbulence in the unit being drained. This breaks up air films and "pumps" air down to the trap so it can be vented.

The vents in standard Armstrong trap buckets will pass all the air normally encountered. In special cases, such as paper machine dryers, the vents are correctly sized larger at the factory to meet the requirement.



Thermostatic vent open. Thermostatic vent closed.

Fig. 5. Open float with thermostatic vent for off-and-on units. When trap is cold, vent is open, permitting air to blow through when steam is turned on. When steam reaches trap, heat closes thermostatic vent. Then, regular bucket vent handles all air coming in with steam.

Open Float with Thermostatic Vent

Super air-venting capacity is a must for fast heat-up of low pressure unit heaters, heating coils, steam headers and other units that are on-and-off. Figure 5 shows how the Armstrong open-float-with-thermostatic-vent trap takes care of this.

The 44-page Armstrong steam trap book covers other features of the Armstrong trap as well as its excellent air handling characteristics. This catalog also discusses trap selection, installation and maintenance. Your local Armstrong Representative or Distributor will be glad to give you a copy. Call him, or write Armstrong Machine Works, 8806 Maple Street, Three Rivers, Michigan.

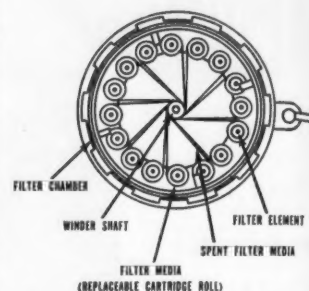


ARMSTRONG STEAM TRAPS

PROCESSING

wound (usually 1 to 4 weeks) an alarm rings. It is then necessary to remove the central spool and replace the cartridges. This takes only about 30 minutes.

Unit can filter water at rate



FILTER MEDIA (REPLACEABLE CARTRIDGE ROLL)

Winder shaft (center) unwinds filter media from the individual cartridges when pressure drop across filter reaches predetermined point

of 4 gpm per sq ft of filtration area with pressure drop of only 3 psi. Diameters of filters range from 14 to 48". Units can be constructed from various steels and alloys. Filter areas range from 400 to 7500 sq ft.

(Cyclamatic Type-117 filter was developed by Industrial Filter and Pump Mfg. Co., 5908 Ogden Avenue, Chicago 50, Illinois.)

Check 5764 opposite last page.



"Well, I didn't exactly start on a shoestring, but it all originated in a 'pipe dream'!"

PROCESSING

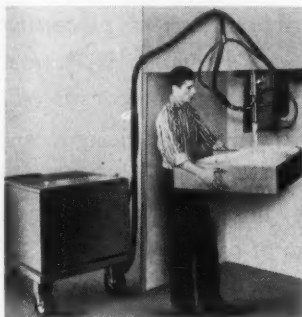
Polyurethane foam made at rate of 30 lb/min by mobile unit

Compact unit can be moved easily to point of use

Uses: Producing polyurethane foams.

Features: Mobile unit can handle all types of polyurethane foam formulations. Delivery rate is adjustable between 0 and 30 lb per minute. Unit is compact, fits through standard width doors or rear opening of station wagon.

Description: Equipment contains two resin systems (quasi-prepolymer) and is designed for use with spray guns or mixing heads for rigid



Compact, mobile unit is designed to handle all types of polyurethane foam formulations

foam applications. Catalyst system can be substituted for one of the resin systems to produce flexible foams.

The two resin tanks each have 5-gal capacity. Heaters are designed to give uniform heat distribution and to permit easy disassembly. Temperatures can be controlled to within plus or minus 2°F.

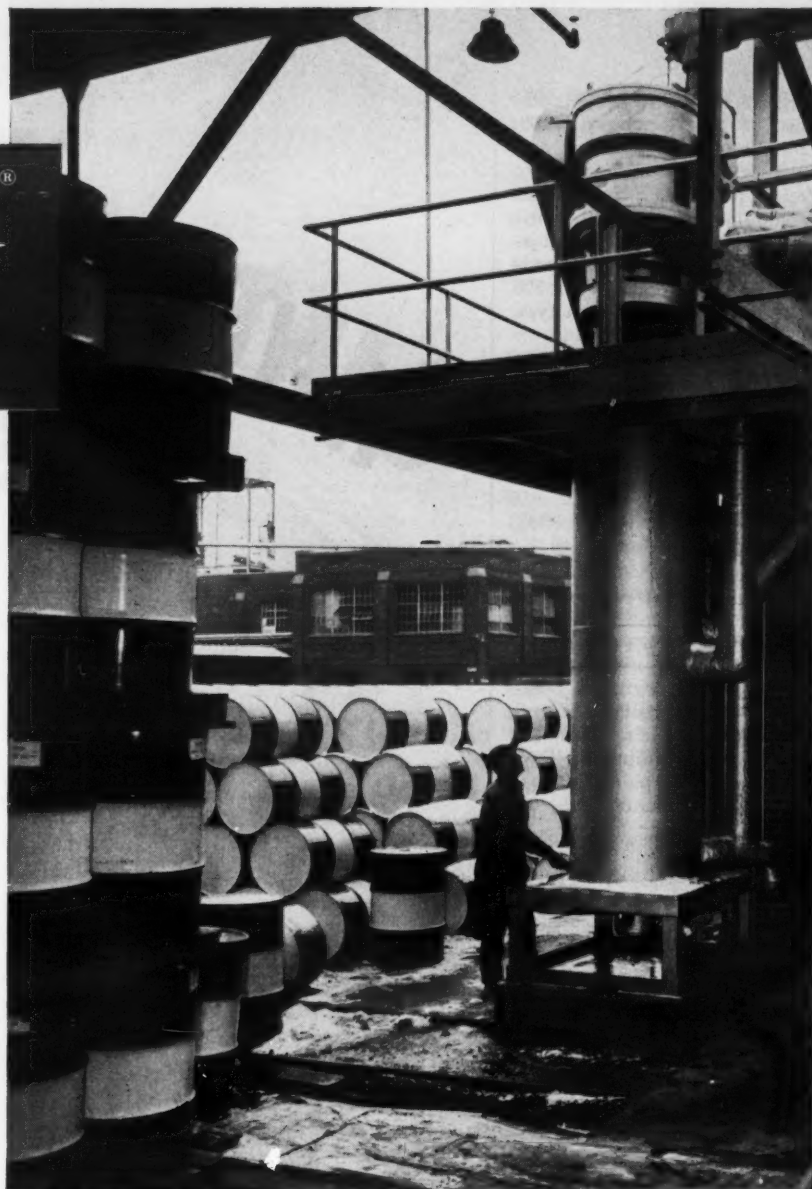
Pumps are rotary-gear type, all-bronze construction, adjustable, capable of supplying accurately metered proportions. Hoses are electrically heated to provide any temp from ambient to 170°F.

Overall dimensions of unit are 32x34x26½" high. When mounted on standard 3-wheel cart, height is increased 12". Complete package costs about \$7500. This does not include spray gun or mixing head.

Cabinet-type equipment is also available. Delivery rate



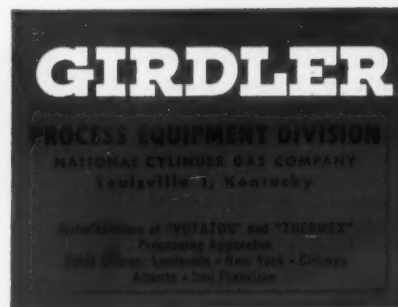
Rapid cooling gives heat-sensitive resin added life



New outdoor installation of VOTATOR Continuous Cooler at Bakelite Company, a Division of Union Carbide Corporation, Bound Brook, N. J.

AT BAKELITE COMPANY, another VOTATOR* Cooling Unit has recently been installed to increase output of their quality phenolic resins. The original equipment has been in constant use since 1946. In this application, function of VOTATOR Processing Apparatus is to prolong product life by rapidly cooling the resin prior to filling into drums, tank cars or storage tanks. As temperature drops, viscosity increases to more than 4000 cps. Output is 5,000 to 10,000 lbs. an hour.

Find out how you can improve *your* product and cut costs with VOTATOR Heat Transfer Apparatus for continuous cooling, controlling heat of reaction, emulsifying, crystallizing and sulfonation. Write for further information.



*VOTATOR—T.M. Reg. U.S. Pat. Off.

Check 5765 opposite last page

PROCESSING

of this is 0 to 15 lb per minute. Cost of this is about \$5100, excluding mixing head and controls. Self-cleaning Du Pont-type mixing heads can be supplied for either the mobile or cabinet-style equipment. Cost of mixing heads and controls ranges from 500 to \$2500, depending upon type requested.

(Further information about polyurethane foam producing equipment may be obtained from The Martin Sweets Company, 114 South First Street, Louisville 2, Ky.)

Check 5766 opposite last page.

Vacuum-shelf dryer data

Bulletin of four pages describes vacuum-shelf dryers for safe, rapid drying of heat-sensitive, air-sensitive, or pyrophoric materials. Bul 630 — Vacuum Equipment Div., F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.

Check 5767 opposite last page.

Heavy-duty mixer features 4-way mixing action

Tumbles mix from ends to center, side to side

Uses: Mixing either dry or semi-wet materials.

Features: Designed for heavy-duty mixing, unit has four-way mixing action that tumbles mix from ends to center and also from side to side.

Description: The double mixing shell and ends are constructed of $\frac{1}{4}$ " steel plate. Twin mixing shafts are made of special axle steel, with plow steel mixing blades. Roller chain drive operates off heavy-duty gear reduction unit.

Three-ton capacity mixer has overall length of 140" and 94" width. Inside dimensions are 120x82". Shell is 51" high. Four-ton capacity unit is also available for dry mixing.

(Marion twin mixers are product of Rapids Machinery Company, Marion, Iowa.)

Check 5768 opposite last page.

If You process SLURRIES, Let Sharples Advanced

Sharples 1958 Model Continuous Centrifuges are designed to give you the big edge in economical processing to meet today's competitive market conditions...and tomorrow's as well.

Sharples advanced design centrifuges set new standards of performance, flexibility of operation and range of capacity.

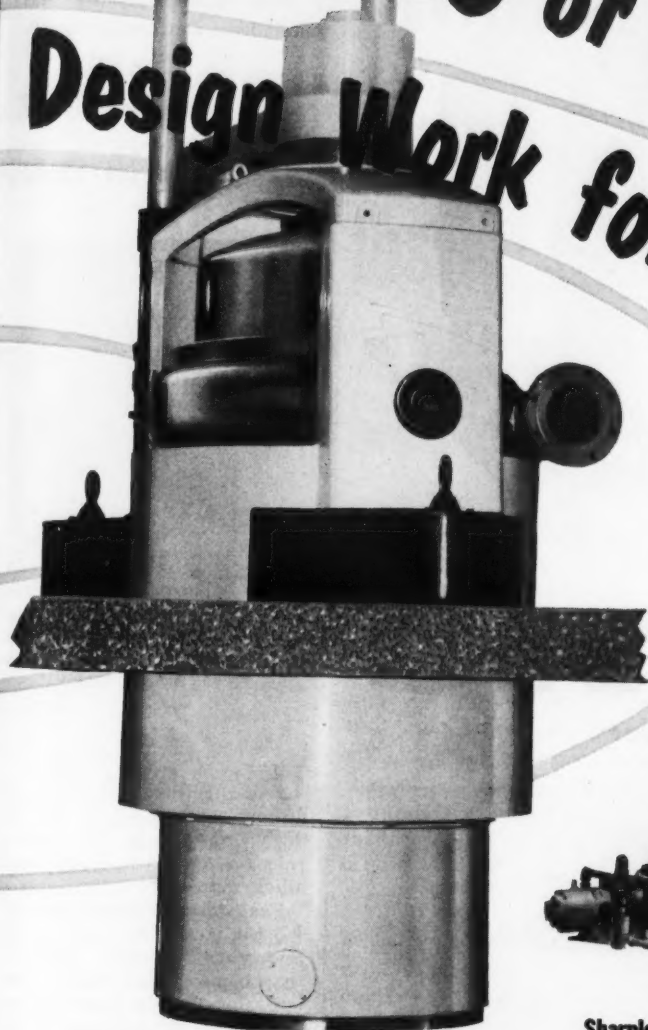
There are many specific facts that warrant the close scrutiny of those to whom the purchase of new plant equipment must be an outstandingly profitable capital investment.

Compare the new Sharples 1958 lines with the best you have experienced heretofore—and be convinced.

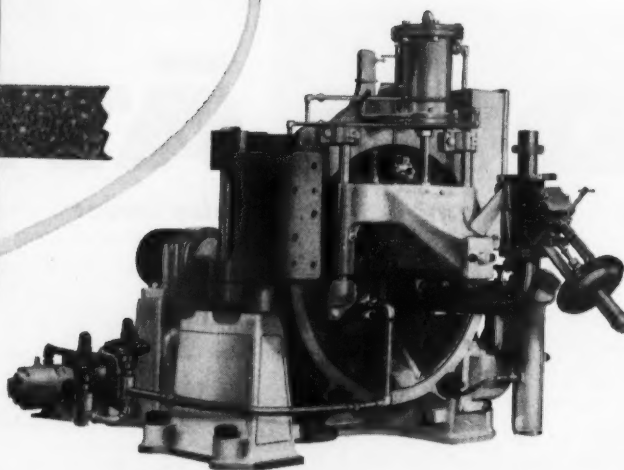


Sharples 1958 Nozjectors—A series of nozzle type disc bowl centrifuges with feed capacities up to 400 gallons/minute; up to 125 HP drive.

S, SLUDGES or CRYSTALS Design Work for You...



Sharples 1958 Super-D-Canters—Models for dewatering solids at feed rates as low as 1 gpm up to 250 gpm; solids discharge rates from below 25 lbs./hr. to approx. 12 tons/hr.



Sharples 1958 Super-D-Hydrators—A line of high efficiency crystal dehydrators with capacities ranging from 1 to 2 tons of crystals/hr. up to 20 tons or more/hr.

SHARPLES

THE SHARPLES CORPORATION
2300 WESTMORELAND STREET • PHILADELPHIA 40, PENNSYLVANIA
NEW YORK • PITTSBURGH • CLEVELAND • CHICAGO • CINCINNATI • DALLAS • DENVER • DETROIT • HOUSTON • KANSAS CITY • LOS ANGELES • MINNEAPOLIS • NEW ORLEANS
Associated Companies and Representatives throughout the World

Check 5769 opposite last page

Thin-film processing unit redesigned, improved

Incorporating a number of major design changes, an improved thin-film processing unit is now being manufactured. Known as the Turba-Film Mark II Processor, the mechanically aided thermal machine is designed for processing viscous fluids and heat-sensitive materials.

Major change is in the rotor drive mechanism. Integrally mounted drive prevents deflection of rotor to keep proper film thickness in the thermal section.

Rotor bearing rigidity has been improved by means of a hollow shaft through which the solid rotor shaft extends. Shaft is supported by bearings and prevents any rotor shaft deflection from being transferred to the bearings.

Stability of unit has been increased and vibration minimized by new support design. Mounting brackets have been relocated, being welded directly to the heavy jacket shell.

Other changes have been made in jacket design. Jacket sealers permit differential expansion in jacket without excessive stress at section end flanges, fully meeting ASME code.

Special well-type bearing housing has been combined with an elliptical flanged ASME head to permit external alignment of the bearing with the shaft.

(Further information about The Turba-Film Mark II Processor may be obtained from Rodney Hunt Machine Co., Process Equipment Div., 117 Vale St., Orange, Mass.)
Check 5770 opposite last page.

Describes jaw crusher

Bulletin of four pages presents full details on manufacturer's high output, low power, overhead eccentric jaw crusher. Jaw crusher bul — Kennedy Van Saun Manufacturing & Engineering Corp., 2 Park Ave., New York 17, N. Y.

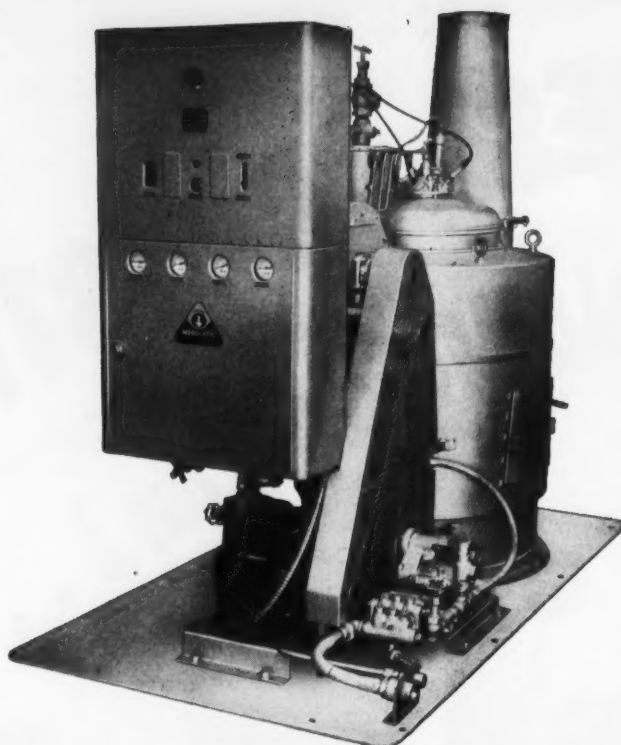
Check 5771 opposite last page.

over 13,000
Modulatics in use today
prove they

Save

- SPACE
- FUEL
- LABOR

Modulatic needs no enclosure, special foundation, expensive stack. It's shipped fully assembled—just connect and fire up. Base plate, upon which the 60-h.p. unit shown at right is delivered, measures only 4' x 7'.

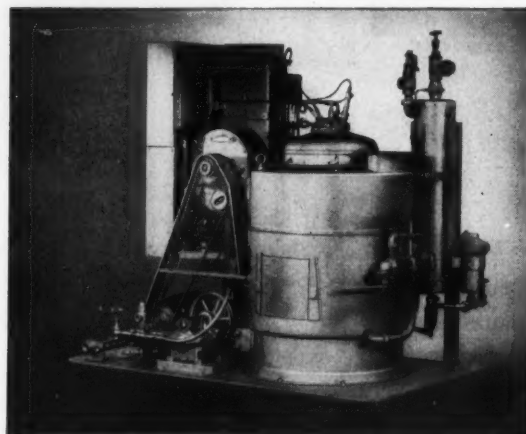


MODULATIC

...world's most compact water tube boiler

Takes No More Space Than A Desk and Chair! This pocket-size power package does a "big-boiler" job to solve your steam problems. Compact, complete, it fits anywhere . . . in unused corners, aisles, balconies . . . to provide all the steam you need, where you need it, when you want it. Fully automatic, push-button operation—set controls for pressure desired . . . Modulatic does the rest. Saves fuel—steam produced only "on demand". Clean, quiet operation . . . practically no maintenance. And for large steam requirements, multiple installations provide same steam capacity, in far less space, than conventional boilers. Single, coordinated control cuts individual units in and out to meet changing steam demands . . . far more economically and efficiently than idling larger boilers.

Ask for free 12-page Modulatic Bulletin No. 586



Sizes range from 10 to 160 h.p.; pressures from 5 to 300 p.s.i. and much more, if required. Maximum floor load, only 150 lbs./sq. ft. Choice of oil, gas, or combination burner. Steam from cold starts in 2 minutes ends early reporting and standby.

VAPOR HEATING CORPORATION

80 East Jackson Boulevard • Chicago 4, Illinois
Offices in principal cities — Dept. 3-F.

Processing a wide range of materials at 1/3 the power, with 5 times greater capacity than conventional units, machines . . .

sift, filter,
with sonic



Sonic sifter is capable of making separations down to 30 microns. The eight square boxes on top of unit are the electromagnets

Uses: Sifting, filtering, or de-watering wide variety of dry, semi-wet, or wet materials in chemical, food, and allied industries.

Features: Machines use only 1/3 the power, but have up to five times greater capacity than conventional mechanical-activated devices of same size. Depending upon screen being used, sifters can separate particles 1/2" and larger to as fine as 30 microns (425 mesh).

Machines operate on principles of sonic vibration. Oscillations are imparted at right angles to the screen. Intense up-and-down vibrations minimize screen clogging and abrasion and insure maximum screen life and efficiency.

Description: Machines were developed in Germany and have found use in a wide variety of industries in Europe. Specific units are available for processing dry, semi-wet, or wet materials. Although overall appearance of these individual machines differ somewhat, all operate on same

Check 5772 opposite last page

PROCESSING EQUIPMENT

and de-water
vibrations



Sonic unit for de-watering and classifying slurries consists of a screen mounted trough-like above a filtrate funnel. Effluent rolls off end of screen

basic principle. (Laboratory analysis equipment operating on this principle is described in article starting on page 132 of this issue.)

Screens are agitated by electromagnetic vibrator units producing a basic oscillation of 120 cps from a main frequency of 60 cps. Amplitude can be adjusted as required. Superimposed upon the basic frequency is a series of harmonics which often build up the basic oscillation to more than 6000 cps.

Energy from the vibrators is transmitted direct to the screen.

The combination of the fundamental oscillation together with the induced harmonic vibrations causes every part of the screen to vibrate.

Violent up-and-down vibratory action is achieved with very little flexing of the screen itself — the screen moving only about two millimeters.

Number of vibrators needed depends upon size of screen. Sifter with 16-3/4 x 31-1/4"

Mikro-D Twin Unit Installation



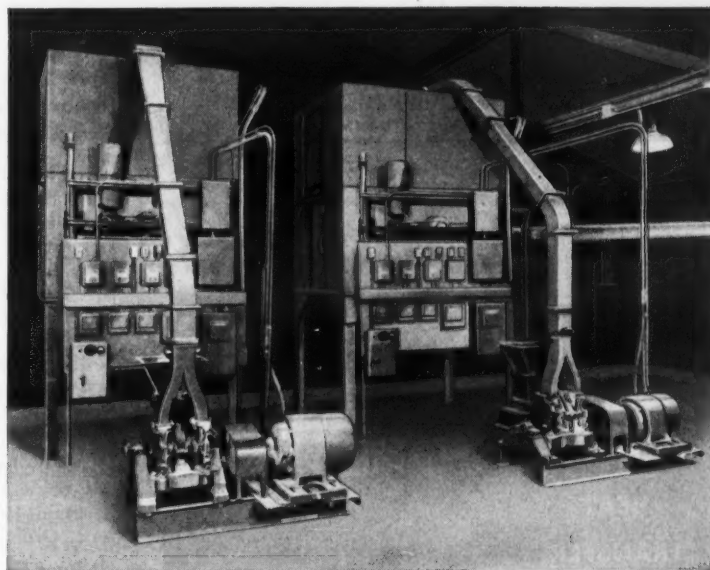
GRINDS

CHEMICAL POWDERS

"TO ORDER"

To meet the problem of grinding powders to exact specifications, more and more chemical plants are relying on the quality and round-the-clock dependability of MIKRO-D Pulverizing and Dust Collecting equipment. In many of these plants, flexible twin-unit installations are putting greater efficiency and economy into the production of finely ground chemicals, providing required capacity for peak periods as well as alternate operation.

MIKRO-D equipment is designed to help you put new efficiency and economy into whatever products you grind. We'll be glad to make test runs on the unground material and submit recommendations entirely without obligation. Whether your operation calls for a standard unit or a specially-engineered system, MIKRO-D can fill all your grinding and collecting requirements. Complete information available on request.



Installation consisting of two MIKRO-ATOMIZERS, each connected with and discharging to MIKRO-PULSAIRE COLLECTORS.

GENUINE MIKRO-D REPLACEMENT PARTS
Available From Large Stock Within 48 Hours.

Mikro-D

PULVERIZING MACHINERY DIVISION
METALS DISINTEGRATING COMPANY, INC.
60 Chatham Rd. Summit, New Jersey

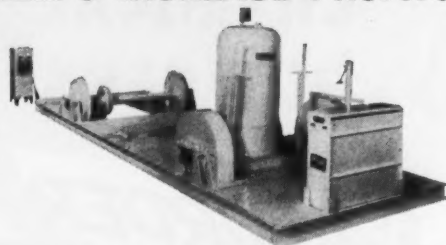
**MANUFACTURERS OF
PULVERIZING, AIR
CONVEYING AND DUST
COLLECTION EQUIPMENT**

Check 5773 opposite last page

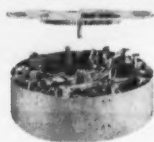
MECO

Handling equipment
with fingertip control . . .

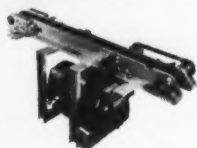
SAVES PRODUCTION TIME HELPS INCREASE PROFITS



A complete series of battery powered transfer cars for heavy duty use. Models for transferring dryer and rack cars or other heavy, bulky items. Two forward speeds and reverse, positive foot and hand brakes, or electric brakes, fingertip control. No trolley or other electrical connections needed. Selenium rectifier charges battery.



Electronically operated turntable speeds up loading, reduces operator fatigue. Rotates heavily loaded cars or racks to nine positions quickly and smoothly. Push button controls.



Heavy duty car pusher speeds loading of dryers and kilns. Capable of pushing 17 loaded cars into position. Mounts under track. Rugged construction means long life, minimum maintenance.

THE MANUFACTURERS EQUIPMENT COMPANY
218 MADEIRA AVENUE • DAYTON, OHIO

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make



your headquarters
for **STANDARD**
or **SPECIAL**
HEAT
TRANSFER
UNITS

STANDARD SK Type "BD" Heat Exchanger, two-pass design for service in petroleum, power, chemical processing, and other industries. Also made in single-pass design.

SPECIAL SK Radiafin Air Cooler, one of two large coolers designed and manufactured for a special project. SK welcomes inquiries for special units—willingly offers experienced assistance.

Get Full Details. Write for Bulletin HT-1.



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Jet Apparatus: Ask for Condensed Bulletin J-1	Motometers & Flow Indicators: Ask for Condensed Bulletin RA	Valves: Ask for Condensed Bulletin V-1	Heat Transfer Apparatus: Ask for Condensed Bulletin HT-1	Seal Pumps: Ask for Bulletin T-1
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Check 5775 opposite last page

PROCESSING

screen area uses 8 vibrators. Only the screen vibrates, the frame and its suspension remaining stationary. This keeps energy requirements to a minimum. Energy produced is expended directly at point of use. Screen vibration does not convey the material being processed. This is accomplished by adjusting the tilt angle of the screen.

Screens are sealed, operate dust-free, and come complete with frame, hopper, and collecting cone. Units are compact, lightweight, and require no special mountings or foundations for installation.

(Novo sonic machines are manufactured by United Specialties Company of Illinois, a subsidiary of Industrial Enterprises, Inc., 9705 Cottage Grove, Chicago 28, Illinois.)

Check 5776 opposite last page.

Linear polyethylene filtration tanks

Filtration tanks fabricated from linear polyethylene are now on the market. Resistant to moisture and corrosive attack, units measure 27" OD, 36" deep, and have 1/2"-thick wall. Tanks are also fitted with linear polyethylene pipe. Welded steel support cradle encloses tank. Steel lug plates on cradle are used to position the tank in a process line.

(Polyethylene tanks are product of American Agile Corporation, PO Box 168, Bedford, Ohio.)

Check 5777 opposite last page.

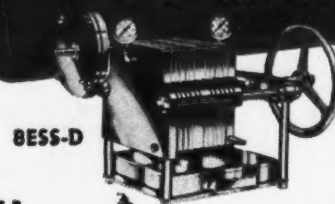
Demineralization data

In addition to several basic sections on application of demineralizers, their principles of operation and the chemistry of the ion exchange resins, 30-page bulletin includes detailed information and charts on materials of construction and design of component parts. Bul WC-111A — Graver Water Conditioning Company, 216 W. 14th St., New York 11, New York.

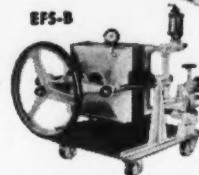
Check 5778 opposite last page.

NOW AVAILABLE...

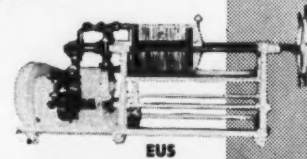
COMPLETE RANGE OF STAINLESS STEEL PLATE & FRAME SHEET FILTERS 4" — 8" — 12" — 16"



BESS-D



EFS-B



EUS

ERTEL
ASBESTOS
FILTER SHEETS
AVAILABLE FOR
ALL FILTERS
UP TO 25"
SQUARE

Ideal for products ranging from ultra fine pyrogen solutions to coarse prefiltered bulk chemicals.

Send for Catalog illustrating the complete line of corrosion resistant filtration equipment.

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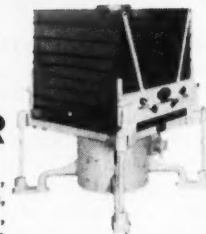
COMPLETE LINE OF
Liquid Handling Equipment



Check 5779 opposite last page

Sifts huge volumes with Big Savings in Floor Space

RICHMOND SPROUT-WALDRON Gyro-Whip SIFTER



Noted for huge output, amazingly compact design, and sanitary operation, these sifters are available in sizes ranging from 3-sieve, floor-mounted models to free-swinging super-sifters with 180 sieves. Stainless steel and wood construction. Can sift from 2 mesh up to 325 mesh. They handle any product that can be mechanically separated. Aspirator tips to air wash graded products can be provided.

Other Sprout-Waldron size classification equipment includes revolving reels, shaking and gyrating screens, air and magnetic separators, and graders. Write for details.

Write for Bulletin 135-A

SPROUT-WALDRON

Manufacturing Engineers Since 1886

LOGAN STREET • MUNCY, PA.

EQUIPMENT FOR SIZE REDUCTION—MIXING & BLENDING—BULK MATERIALS HANDLING—PELLETING & CUBING—PRODUCT CLASSIFICATION

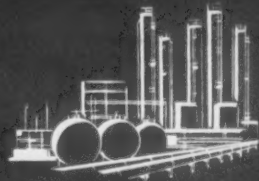


Check 5780 opposite last page

CHEMICAL PROCESSING

WOLVERINE TUBE

*Items of Interest
to the Processing Industry*



PUBLISHED BY WOLVERINE TUBE DIVISION

How Wolverine Trufin® Type S/T Saves Time and Money for Aurora Gasoline Company

BY ERNEST DODD

In the Michigan refineries of Aurora Gasoline Company, Wolverine Trufin Type S/T—the integrally finned tube for shell and tube heat exchangers—is helping Aurora boost capacity and increase on-stream time by reducing costly shut downs for cleaning. Just take a look at the following examples:

EXAMPLE 1

A Trufin-tubed naphtha condenser still on stream after five continuous years of operation without downtime for cleaning on the shell side. In addition this unit has maintained throughput at a level 70% higher than the plain tube unit it replaced.

EXAMPLE 2

Five Trufin-tubed heat exchangers used in a gas concentration unit have been on stream continuously for more than two years without requiring shell side cleaning.

EXAMPLE 3

Four Trufin-tubed heat exchangers used in the catalytic cracking unit's condensing-subcooling service are still going strong after three years of continuous service without shutdown for cleaning on the shell side.

Small wonder indeed that Aurora engineers have placed their stamp of approval on Wolverine Trufin Type S/T heat exchanger tube. In addition to the benefits described above, Wolverine Trufin, because of its extended surface, transfers more BTU's per foot of tube — making possible substantial savings in direct tube costs.

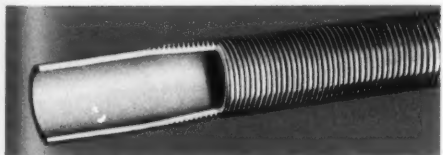
For your heat exchanger and condenser tube needs why not follow the lead of Aurora Gasoline Company—specify Wolverine Trufin Type S/T—experience for yourself the increased efficiency and savings this integrally finned tubing will bring your way.

GET VALUABLE BOOK FREE

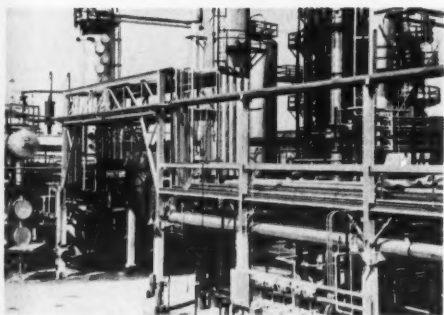
Detailed breakdowns in cost differentials between prime surface and integrally finned condenser tubes are graphically explained in

Wolverine's new "Design and Cost Comparison of Heat Exchangers" book. Write for your free copy—TODAY!

Wolverine Trufin is available in Canada through the Unifin Tube Division, London, Ontario.



WOLVERINE TRUFIN TYPE S/T

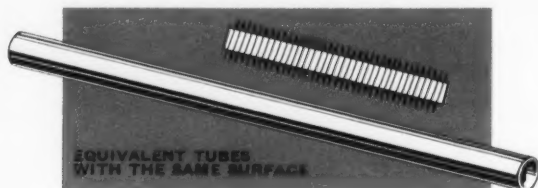


CALUMET & HECLA, INC.
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WOLVERINE TUBE DIVISION
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WOLVERINE TUBE
DIVISION OF
CALUMET & HECLA, INC.
17234 Southfield Road
Allen Park, Michigan
Manufacturers of Quality Controlled Tubing and Extruded Aluminum Shapes

FACTS YOU SHOULD KNOW ABOUT WOLVERINE TRUFIN® TYPE S/T

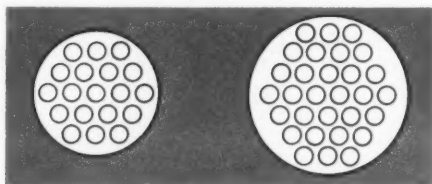
In modern heat transfer applications engineers are obtaining new standards of efficiency through the use of extended surface heat exchanger tube. Such a tube is Wolverine Trufin Type S/T—the original integrally finned tube—developed and pioneered by Wolverine Tube. Listed below are some of the time and money-saving benefits made possible through the use of this exclusive Wolverine product.



Trufin is an extended surface tube—with fins extruded right from the tube wall—it has more than 2½ times the outside area of plain tube. Less tube is required because Trufin transfers more BTU's per foot of tube.

Fewer tubes mean smaller shells, tube sheets, baffles, etc. This means greater savings in materials required.

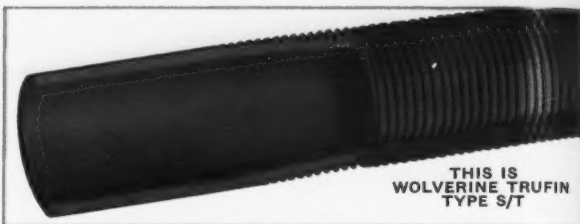
Fewer tubes mean fewer holes to drill—less rolling-in operations. Direct result: substantial savings in labor costs.



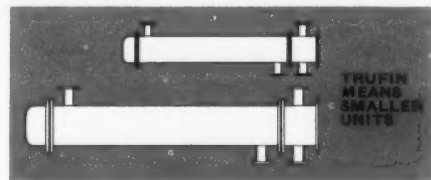
To transfer a given heat load—when Trufin is used—much less weight of overall tube metal is required. This is a real saving when expensive alloys are necessary. This is of greatest importance when alloys are in short supply, as a given amount of metal in Trufin transfers much greater heat loads.

Lighter units using less structural support can be designed because of the material savings made possible by Trufin. This is vital when units are to be super-structure mounted.

Maintenance costs are reduced. Costs of replacement tubes are slashed; fewer tubes result in less cleaning time, longer on stream time. Actual operating data proves Wolverine Trufin withstands fouling for longer periods than prime surface tube. This increases intervals between "turnarounds".



Smaller, lighter units result in easier handling and lower shipping charges.

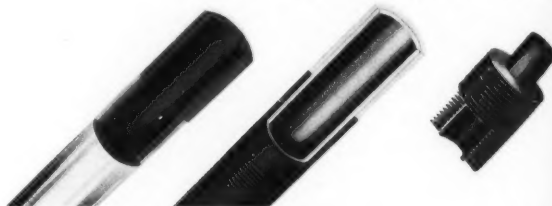


Where space is at a premium—as in replacement units—Trufin-tubed bundles will increase capacity with the same number of tubes.

These are but a few of Wolverine Trufin's many advantages. For more complete information write for your copy of the Trufin Catalog. Do it TODAY!



NOW! BOND-RESISTANCE TESTING FOR BI-METAL TUBE



A new Wolverine Heat Transfer Tester has been developed which accurately measures **bond-resistance** of Wolverine Trufin Type L/C and other bi-metal tubes.

Exhaustive tests during manufacture have shown bond resistances of Type L/C to be negligible. This is another step by Wolverine to insure your receiving the highest tubular quality.

CALUMET & HECLA, INC.
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PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES

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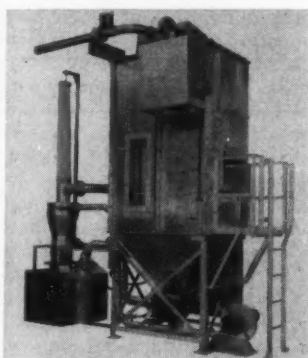
PROCESSING

Fumes at 600°F filtered by glass-fiber bag dust collector

Uses: Collecting hot, corrosive dust and fumes.

Features: Unit uses glass-fiber cloth filter bags, capable of operating at temperatures up to 600°F. Collection efficiencies exceed 99½%. The cloth resists most substances except fluorine and hydrofluoric acid.

Description: Filter bags used are single-hung tubular type, made of glass-fiber cloth which has been treated for protection against fracture.



Hard to collect dusts are handled easily by dust collector with glass-fiber bags

Adequate spacing between adjacent bags prevents bag contact during shaking.

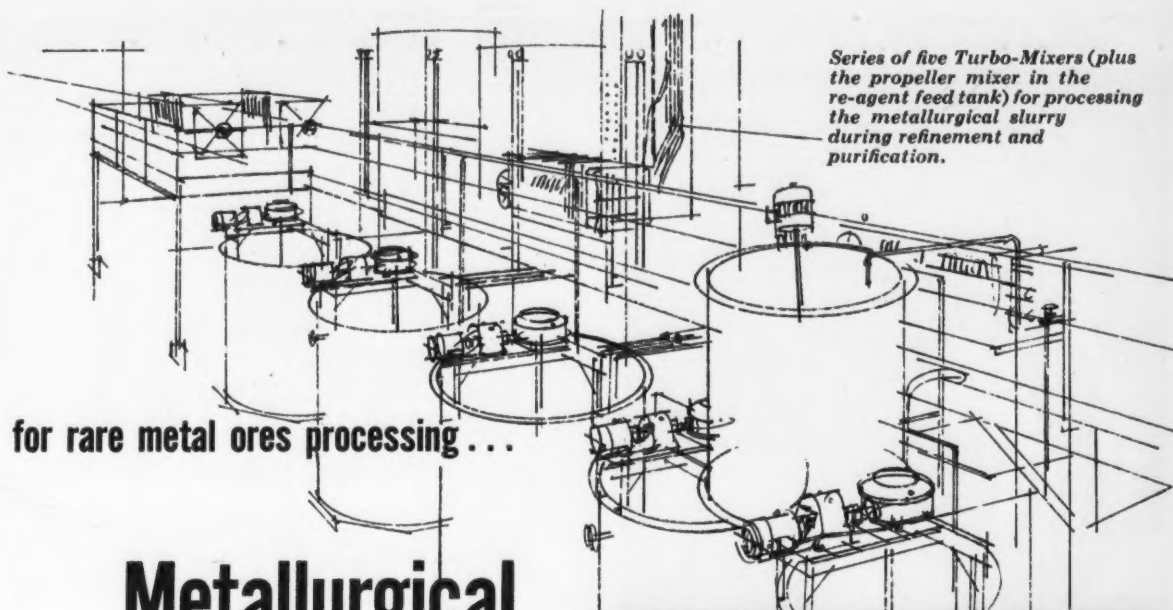
Air cleaning action is much the same as in other conventional dust collectors. Dust- and fume-laden air is drawn into the unit and upward into the bags.

Cloth traps essentially all of the particles. Periodically, bags are shaken to loosen collected material so that it falls to bottom of hopper and is discharged for reuse or disposal.

(Glass-bag filters are product of Dracco Corporation, 4063 East 116th Street, Cleveland 5, Ohio.)

Check 5781 opposite last page.

For more information on product at left, specify 5782 . . . see information request blank opposite last page.

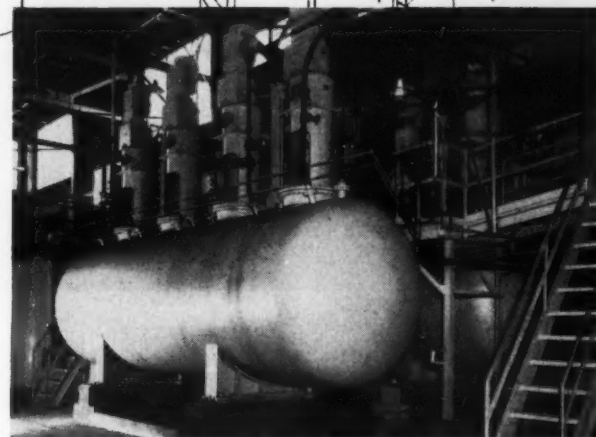


Series of five Turbo-Mixers (plus the propeller mixer in the re-agent feed tank) for processing the metallurgical slurry during refinement and purification.

for rare metal ores processing . . .

Metallurgical Resources chooses TURBO-MIXERS

There is no easy way to extract rare metals from their ores. Processing plants, such as that of Metallurgical Resources, Inc. of Newburgh, New York, call for skillful design and dependable processing equipment. To help put this new plant "on stream", Turbo-Mixer custom made all of the equipment required.



Four-compartment autoclaves for pressure leaching of ore. Each mixer consists of a mixing and aeration assembly to accomplish the contacting of the liquid-solid-gaseous phase system.

Turbo's 45 years of experience in design . . . Turbo's record of dependability . . . and Turbo's single-source responsibility make the difference. If you are in the process of selecting or specifying mixing equipment, call on Turbo. You'll find . . . it pays to plan with General American.

FOR DETAILED INFORMATION AND USEFUL DESIGN DATA, SEND FOR THE FOLLOWING BULLETINS:

Please send me the following Turbo-Mixer Bulletin (s):

General Turbo-Mixer Bulletin_____

RDC Extraction Column Bulletin_____

Side Entering Propeller Mixer Bulletin_____

Absorption & Oxidation Bulletins_____

TURBO-MIXER DIVISION
GENERAL AMERICAN
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Sales offices: 380 Madison Avenue, New York 17, New York • General Offices: 135 South LaSalle Street, Chicago 90, Illinois • Offices in all principal cities

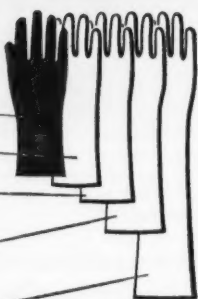
Check 5783 opposite last page



These Stanzoil Milled Neoprene Gloves
Guarantee Positive Liquidproof Protection in
103 Basic Oils, Acids, Caustics, Greases, Solvents

Black All Neoprene Stanzoids With Non-slip Grip

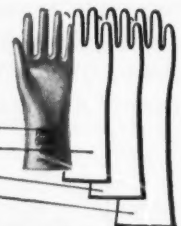
Model	Weight	Fingers	Length
N-31	Light	Straight	10½"
N-35	Light	Curved	10½"
N-32	Medium	Straight	11"
N-36	Medium	Curved	11"
N-41	Heavy	Straight	12"
N-44	Heavy	Curved	12"
N-51	Heavy	Straight	14"
N-33	Light	Straight	14"
N-54	Heavy	Curved	14"
N-71	Heavy	Straight	18"
N-73	Light	Straight	18"
N-74	Heavy	Curved	18"



White All Neoprene Stanzoids With Smooth Finish

Model	Weight	Fingers	Length
N-30	Light	Curved*	10½"
NW-31	Light	Straight	10½"
NW-32	Medium	Straight	11"
NW-41	Heavy	Straight	12"
NW-51	Heavy	Straight	14"

*Non-slip



FREE Hand Protection Analysis . . . Send a description of your job requirements (length, dexterity, wear resistance, chemicals used, importance of safe grip, hot or cold temperature extremes, fatigue factor and sizes) to our "Hand Protection Clinic." New catalog and price list available on request.

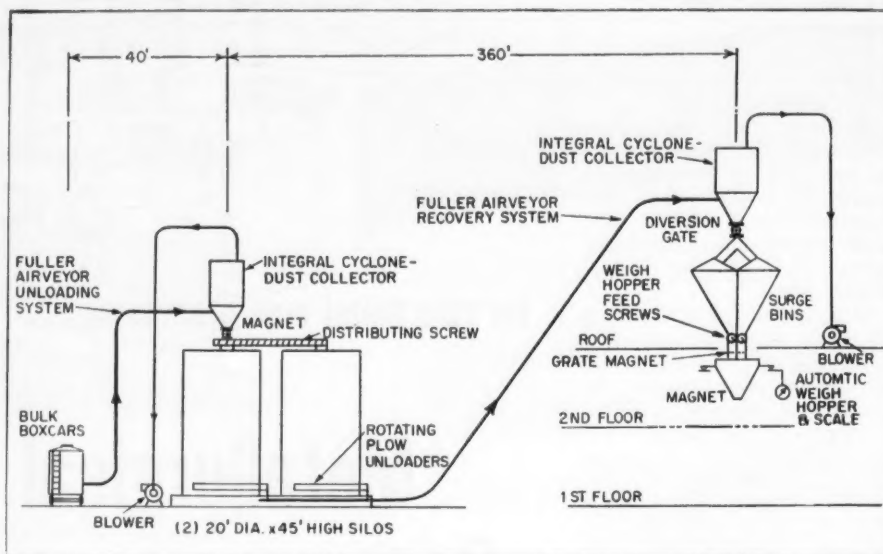
the PIONEER Rubber Company
241 Tiffin Road, Willard, Ohio

Check 5784 opposite last page



**PLANT ENGINEERING
MAINTENANCE & SAFETY**

. . . electrical & mechanical developments



Shift to bulk handling has allowed General Electric to save 60% in labor costs on wood-flour handling. In designing the system, safety was first; economy, second. Here's how they took advantage of . . .

built-in safety in pneumatic handling



Wood-flour is unloaded from box cars via pneumatic conveying system into one of two 45-ft-high storage silos

In choosing part of a pneumatic handling system, GE decided to sacrifice economy of operation to gain higher degree of safety. With the conveying distance involved, a pressure system would have been more economical in power requirements. They specified a vacuum system in which turbulence, velocity, and oxygen in conveying stream would be such so as to reduce possibility of explosion.

A strict set of safety specifications were laid down by General Electric engineers for pneumatic conveying system designed to handle wood-flour at the Pittsfield, Mass., plant. Wood-flour is finely ground wood material used as filler in manufacture of phenolic molding compounds.

Handling system incorporates built-in safety features such as numerous explosion vents and magnets to remove spark-producing metals. It includes two pneumatic conveying systems providing an

Flow diagram of General Electric's storage and pneumatic handling system for highly explosive wood-flour shows placement of magnets to remove spark-producing metal. Both silos and conveyors contain numerous explosion vents

automatic operation requiring only one full-time operator and one part-time operator. First system handles unloading from railroad cars into two 45-ft-high storage silos, and second system reclaims stored material for processing plant more than 360 ft away.

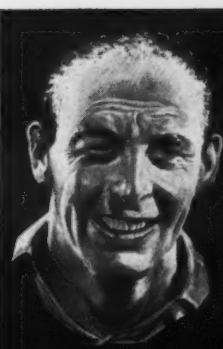
Both conveying systems are of the vacuum type, although their required operating capacities differ. In unloading operations, material is conveyed at a rate of six tons an hour through a 6-in line leading from unloading station to cyclone dust collector atop storage bins. Conveying rate to processing is five tons per hour through a 5-in line. Vacuum for first system is provided by 40-hp exhaustor; 50-hp exhaustor is used with second system.

Unloading station is large enough for spotting two box cars, though only one is unloaded at a time. Operator inserts a pneumatic intake nozzle on floor of car. He then selects from a set of nearby switches in order to direct material into one silo or the other depending upon which grade wood-flour is being unloaded.

Transfer of material to silo No. 1 is made direct from totally enclosed rotary feeder at base of filter-receiver. Transfer to other silo is from 12-in screw conveyor extending from receiver. Latter is designed to provide 100% retention of visible dust under normal operation.

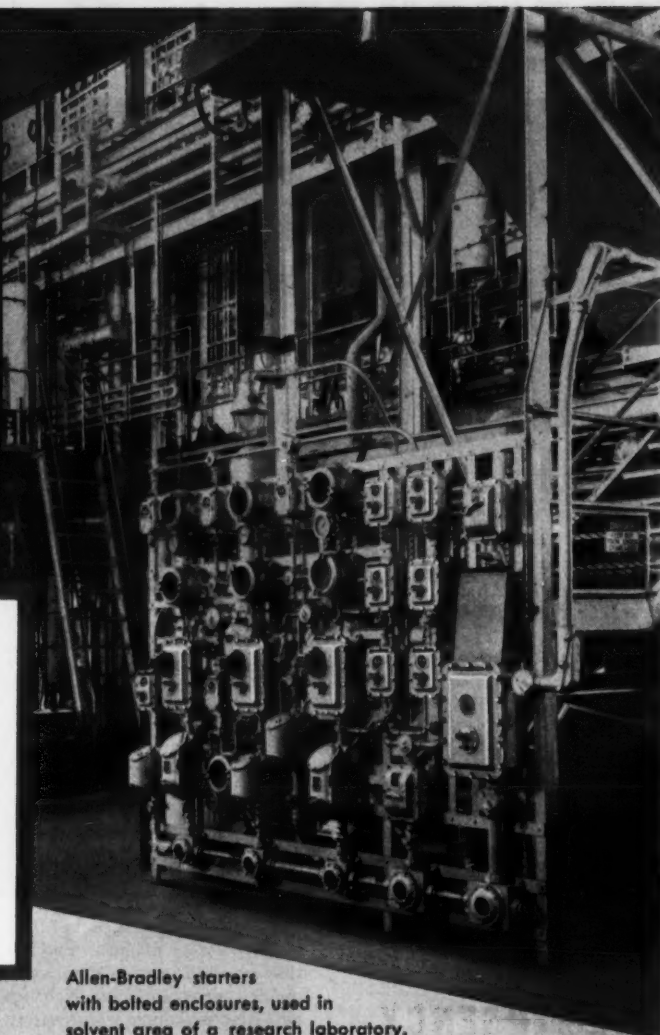
Both receiver and silos contain numerous vents of aluminum foil or masonite to provide ready outlets in case of explosion. In some places, vents consist of waterproof paper backed by foil. Venting has been incorporated into both conveying systems, with minimum of 1 sq ft to every 30 cu ft of interior space. Venting at certain locations runs twice as high.

Rotary feeder at base of

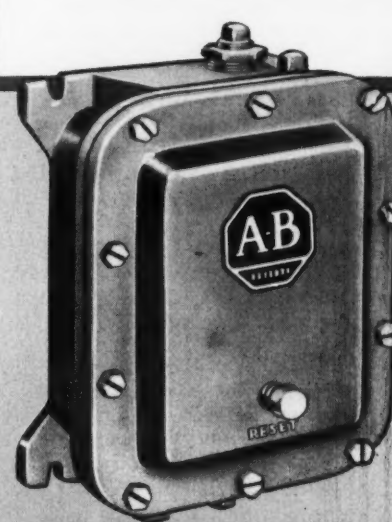


Why

waste time taking off starter covers?



**Allen-Bradley starters
are good for millions
of operations...
without maintenance**




**Bulletin 709 Size 1 Solenoid Starter in
NEMA Type 7 explosion-proof enclosure.**

Allen-Bradley Co.
104 W. Greenfield Ave., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

Allen-Bradley
QUALITY
MOTOR CONTROL

**Standardize on Allen-Bradley motor control...
you cannot make a better choice. Please send
for A-B Handy Catalog.**

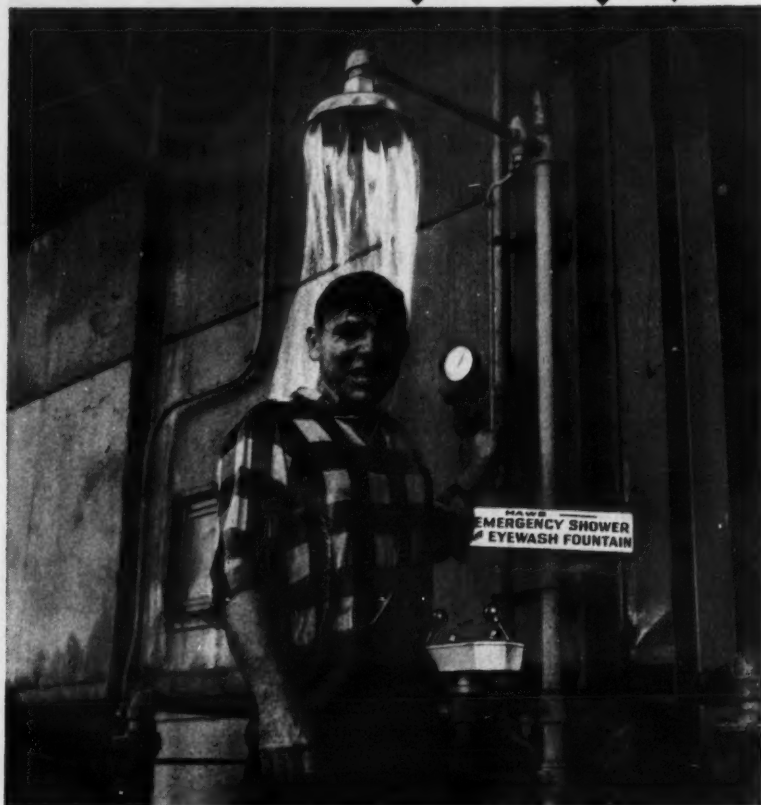


**Allen-Bradley starters
with bolted enclosures, used in
solvent area of a research laboratory.**

**The costly job of removing bolted covers for routine inspection
is eliminated when you use Allen-Bradley starters. The reason
is simple—Allen-Bradley starters are good for millions of
trouble free operations! Their solenoid design... with only
one moving part... has none of the usual trouble-causing
parts. There are no bearings to corrode and stick... no flexible
jumpers to wear and break. And the double break, silver alloy
contacts never need servicing—they are always in perfect oper-
ating condition. The overload relays are unaffected by time
or atmospheric conditions. Stated plainly—you can install
Allen-Bradley starters—and forget them.**

Check 5785 opposite last page

DRENCHED *for Safety!*



HAWS EMERGENCY FACILITIES

• Drench Showers • Eye-Face Wash Fountains

Not just a shower... a **HAWS DRENCH SHOWER!** A quick pull of the chain releases a solid sheet of water to rid body and clothing of dangerous chemicals and caustics. Safety in seconds—saving vital moments until medical aid arrives, perhaps avoiding serious injury. **HAWS Eye-Wash Fountain**, too, is ready to flood eyes from specially designed fountain heads. These are only two items from **HAWS** complete line of emergency facilities to meet every industrial need. Safety authorities stress the necessity of instant irrigation for eye or body contamination. Provide for it with **HAWS** equipment. Get the full facts now, by writing...

HAWS

DRINKING FAUCET COMPANY

Leader in drinking water facilities since 1909
1443 FOURTH STREET • BERKELEY 10, CALIFORNIA

Check 5786 opposite last page

ENGINEERING & SAFETY

each silo delivers material to recovery pneumatic system. Should an explosion take place in this area, it is felt that rotary feeder would be very helpful in isolating damage.

Filter-receiver atop processing plant receives wood-flour and drops it through rotary feeder and two-way gate into either one of two 3000-lb capacity service bins. Constant supply of wood-flour for these bins is assured by means of high and low bin indicators which automatically maintain maximum and minimum level in bins.

Twelve-ft screw conveyor carries material from each service bin to discharge pipe where material falls by gravity through grate magnet into automatic weigh hopper and scale. Delivery is controlled from central control panel, amount of each batch being predetermined and preset.

Further protection is provided by magnet situated at base of weigh hopper as wood-flour passed into an in-plant system of pneumatic conveyors.

Pneumatic systems and silos have replaced handling wood-flour in bags. It is estimated that installation has saved 60% in labor costs, and that original cost of systems including silos will be paid off in about three years.

(Pneumatic conveying systems were engineered by Fuller Co., Subsidiary of General American Transportation Corp., Catasauqua, Pa.)

Check 5787 opposite last page.

(Storage silos and handling systems were erected by General American Transportation Corp., 135 S. LaSalle St., Chicago 90, Ill.)

Check 5788 opposite last page.

Steam generator catalog

Designed as baffleless, pressurized two-drum water tube packaged unit, integrated steam generating plant is fully described in 12-page Cat SB-59 — Erie City Iron Works, Erie, Pa.

Check 5789 opposite last page.

**NEW...PYRAMID DESIGN
INCREASES STABILITY AND
SAFETY OF
BALLYMORE
ALUMINUM Safety-Step
LADDERS**

SANITARY • EASY TO CLEAN LIGHTWEIGHT • EASY-ROLLING

Utilizing a pyramid design, new Ballymore Aluminum Ladders are larger at the bottom than at the top, giving the user greater safety and a secure feeling that tends to increase speed, accuracy and efficiency of work.

Construction is tough, all-welded aluminum tubing, reinforced for maximum strength. There are no rivets, bolts or screws to loosen or lose.



12 MODELS TO CHOOSE FROM, including a convenient, light, 3-step folding ladder. 1-, 2- and 3-step models are available with or without casters. Safety handrails are optional on 2-, 3- and 4-step models, are standard on 5-step ladders. Steps are made of solid, slip-proof ribbed aluminum tread.

Fingertip mobility is provided by large, spring-mounted, smooth-rolling casters which retract under the user's weight. In use, wide-base rubber-tipped legs grip the floor so that ladders are stable and secure.



Write for illustrated folder containing complete information. Ballymore Company, West Chester 10, Pa.

**BALLYMORE
EQUIPMENT
FOR ABOVE-FLOOR
WORKING SAFETY**

THE
STANDARD
BY WHICH
ABOVE-FLOOR
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Check 5790 opposite last page

CHEMICAL PROCESSING

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If you have, you will want to make sure that your **CHEMICAL PROCESSING** will continue to come to you on time.

We are always interested in keeping up to date on our readers.

Maybe . . .

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Naturally you will not want your copy of CP delayed in its journey to you.

Or if you have changed your affiliation, we want to make sure that your copies of **CHEMICAL PROCESSING** will follow you.

Fill out . . .

the slip opposite the back cover.

Be sure to answer all questions regarding your new location, title, and company.

In addition, give us your former address, including company, city and state.

Mail this slip to the Reader Service Department and we will make sure you will continue to receive each issue of the magazine promptly.

For more information on product at right, specify 5791 see information request blank opposite last page.



How one **FALK** coupling saved more than \$1,000 per month

Pictured below is a Falk Steelflex Coupling assembly which connects a 2500 hp motor to a reduction unit driving an 18" bar mill in a Midwestern steel plant. This coupling replaced another type which broke repeatedly, causing maintenance expense averaging \$1,000 a month—plus costly production losses. Since installation of the Falk Coupling, with its controlled torque mechanism that disengages when a predetermined overload occurs, there has been no interruption of production. Savings in maintenance and in lost production time are well in excess of \$1,000 per month...dramatic proof of the importance of coupling design!

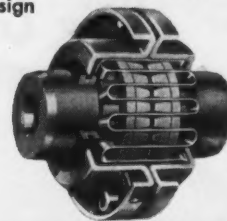
Long coupling life is not the sole criterion of coupling performance. In-

adequate shaft couplings may be the cause of bearing damage or shaft breakage on your machines. If so, a change to Falk Steelflex will give two-fold protection to your connected machines: (1) compensation for reasonable degrees of shaft misalignment, and (2) torsional resiliency to reduce peak loads as much as 30%. These advantages are as important to you as the long service life of the Falk Steelflex Coupling itself.

Falk Steelflex Couplings, in types and sizes to meet virtually all industrial applications, are promptly available from distributor, warehouse and factory stocks. Consult your Falk Representative or Authorized Falk Distributor.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS
Representatives and Distributors in many principal cities

Basic Type F—cutaway view showing exclusive grid-groove design



THE FALK STEELFLEX ...a truly flexible coupling

Here is the coupling that has all the strength of steel, yet is truly flexible. More than a million have been bought for industrial service of many kinds.

Because, in addition to its inherent superiorities of design, the Type F Steelflex can be used horizontally or vertically without modification or special parts, it has been adopted as standard in many plants—and by many designers and manufacturers of industrial equipment...Write for Bulletin 4100.

*Good couplings
not only connect machines;
they prolong machine life
and boost
production!*



FALK

...a good name in industry



Parts Interchangeable ON CHEMPRO "Wedge-Lock" EXTERNAL AND INTERNAL SEALS

Chempro "Wedge-Lock" Line of external and internal mechanical seals is now completely interchangeable in parts, with the exception of the stator bushing, for any given shaft size. This important cost- and time-saving feature is another Chempro FIRST, resulting in

- Savings Through Reduction in Spare Parts Stock
- Gives You More Insurance Against Down-time

Chempro "Wedge-Lock" Seals give highly economical service on pumps handling acids, caustics and other liquids and slurries at temperatures from -80° F. to 500° F., from vacuum to 100 psi. Seal faces are always within the stuffing box, eliminating dangerous spray hazards.

other
CHEMPRO
ADVANTAGES

- ① Simple In Design—Only 8 Parts
- ② Installed In Only 20-30 Minutes
- ③ Seals Completely Interchangeable With Packing
- ④ Low Power Costs—Minimum Friction Load
- ⑤ Flushing, Cooling and/or Lubricating Can Be Supplied On All Seals

Write for Bulletins CP551 and 575

CHEMICAL & POWER PRODUCTS, INC.—
The Original Fabricators of Teflon Packings and Gaskets

9 Broadway, New York 4, N. Y.

Check 5792 opposite last page

ENGINEERING & SAFETY

High-temp pipe covering has built-in tie wires

Insulation is rapidly applied to large-diameter pipe lines

Uses: Material is specifically designed for runs of pipe that are to be weatherproofed with sheet metal or roofing felt.

Features: Built-in tie wires eliminate need for conventional tie wires. Covering can be applied to large-diameter pipe lines as rapidly as molded pipe coverings.

Description: Specially felted from high-temperature, moisture-resistant spun mineral wool, pipe insulation will withstand temperatures to 1200°F. Its exterior surface is faced with a metal fabric of 16-gage wires welded in a



Insulation for pipe has built-in tie wires

2x2½" rectangular mesh, and held in place by 16-gage wires tied through the spun wool to an inner facing of 1" expanded metal lath. Fastening on pipe is accomplished by hooking wires, which extend from one end of the outer mesh fabric, under the opposite stay wire and bending them over and back.

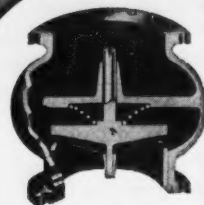
Insulation is especially well suited for covering nested pipes and steam-traced lines since it can be manufactured to fit exactly, with no waste material. Because the material has low alkalinity factor, it will not corrode pipes in the presence of heat and moisture. Pipe insulation is available in 2' sections and 1½ to 4" thicknesses for pipe sizes from 4 to 30".

(No. 101 pipe insulation is product of Baldwin-Hill Co., 500 Breunig Ave., Trenton, New Jersey.)

Check 5793 opposite last page.

Safe, Silent Piping Systems

for Pulp and
Paper Mills



Globe-type valve for lines from 3" to 24"

At Longview
Fibre Company,
Longview,
Washington,
valves installed
in both
vertical and
angular
positions.



WILLIAMS-HAGER
FLANGED

Silent
CHECK VALVES

Systems processing ordinary water and black, green, white, pink and sulphite liquors are protected from water hammer damage by these *Silent* Check Valves. By closing instantly when flow reversal starts, or when flow is zero, they effectively control surge pressures.



Write for Bulletins:
No. 654 on the Valves
No. 851 on Cause, Effect
and Control of Water
Hammer

THE WILLIAMS GAUGE CO., INC.

146 Stanwix Street
2 Gateway Center Pittsburgh 22, Pa.
Our 72nd Year • 1886-1958

Check 5794 opposite last page

CHEMICAL PROCESSING

**Mobile fire-fighting unit
uses dry chemicals —
controls major fires**

Chemicals held in invertible
spheres

Uses: Designed originally
for major oil field fires, unit
has widespread use in indus-
try.

Features: Unit is said to
represent first completely
successful application of dry
chemicals to control major
fires. Radically simple design
allows even an untrained op-
erator to use it effectively —
simply by opening the nitro-



Mobile, dry-chemical fire fight-
ing unit places maximum pro-
tection within cost requirements
of small operations

gen source and hose nozzles.
Effectiveness is gained through
use of an invertible sphere to
store 1500 lb of nitrogen-pro-
pelled dry chemicals.

Description: Compact, mo-
bile, fire fighting unit was
conceived to place maximum
protection within the cost re-
quirements of small opera-
tions.

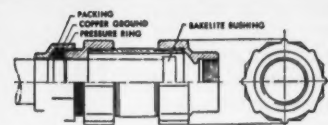
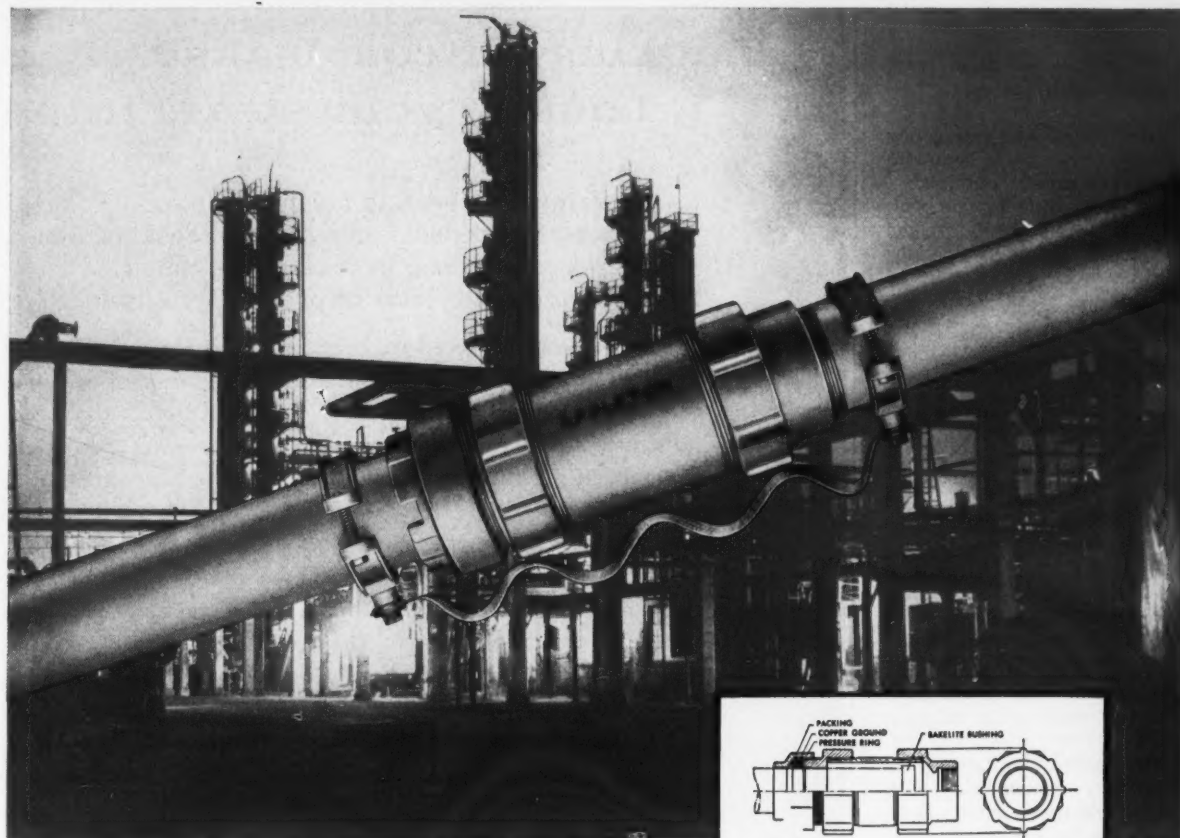
Dry chemicals, propelled by
high-pressure nitrogen flow,
form the primary fire fighting
agent. Eight different assist-
ing agents are also provided.
These include any combina-
tion of either fog or straight
stream with water, foam, wet-
water, or wet-water foam.
Besides the sphere containing
dry chemicals, a second
spherical tank contains the
water supply. Side tanks give
an additional capacity of 30
gal of 3% foam chemicals, 30
gal of wet-water, and a total
of 880 cu ft of nitrogen.

Complete unit is available
mounted on truck trailer or
skids. It can also be custom-
ized, according to specifica-
tions.

(The Fire Boss is product of
Fire Boss, Inc., 411 W. 2nd
St., Odessa, Texas.)

Check 5795 opposite last page.

APPLETON® "XJ" Conduit Expansion Joints



Relieve the *strain* of expansion and contraction on long runs of rigid conduit

Temperature changes place a terrific strain on all long conduit runs. To relieve this potentially dangerous condition, it is best to install APPLETON "XJ" Expansion Joints at frequent intervals along the entire system. These weatherproof joints, for use with heavy-wall conduit, have a metallic packing and a bonding jumper to assure the entire conduit system remains a continuous electrical conductor. The jumper, installed in accordance with U.L. recommendations, gives double protection against extreme expansion movement reducing the effectiveness of the metallic bond.

As the conduit is inserted in the joint, a bushing is placed on the end in the manner shown. This bushing

permits maximum conduit movement and yet the conduit can never pull free of the joint. The APPLETON "XJ" Conduit Expansion Joint features a metallic packing and pressure ring at the flexible end to keep the joint weatherproof at all times.

Wherever a long run conduit installation exists, the need for APPLETON "XJ" Expansion Joints exists. Interior or exterior, from Texas to Maine, temperature strains do exist, so take advantage of APPLETON'S product research program to give you the precision products you require . . . APPLETON "XJ" Weatherproof Expansion Joints for all long run conduit installations.

Sold Through Franchised Wholesalers Only



APPLETON ELECTRIC COMPANY

1701 Wellington Ave., Chicago 13

Also Manufacturers of:



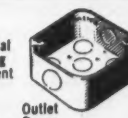
"ST" Series
Connectors



Malleable
Iron
Unifits



Industrial
Lighting
Equipment



Outlet
Boxes

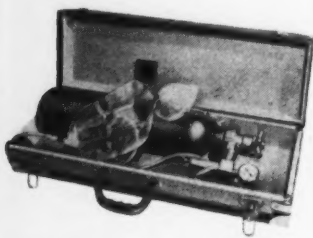
Check 5796 opposite last page

**Lightweight Inhalator
holds 50-minute
oxygen supply**

Unit weighs 21 lb in case,
comes ready for use

Uses: Supplying emergency oxygen until more complete equipment can be obtained.

Features: Simple, compact, lightweight inhalator weighs only 21 lb in case. It provides an oxygen supply lasting 50 minutes or more on 100%



Emergency oxygen supply in compact, lightweight form

oxygen setting. A 50% dilution with air can be obtained with a twist of a dilution valve.

Description: Inhalator is completely assembled with oxygen dilution valve, hose, disposable face piece, breathing bag, pressure regulator (UL approved), and oxygen supply.

(Lightweight inhalator is a product of Davis Emergency Equipment Co., Inc., 47 Hal-leck St. Newark, N. J.)

Check 5797 opposite last page.

**Tough steel-roll roofing
low-cost insulation
for tanks.**

Provides protective finish,
eliminates painting

Uses: For insulating sta-tionary and portable storage

Features: Material provides low-cost, durable, attractive, and easily maintained cover-ing for tanks. Insulation with this method is faster, simpler, and more economical than with any past method.

Description: Insulation con-sists of corrugated steel-roll

Looking for cost leaks? Look at your steam traps

**Engineering approach to steam trapping
can save thousands a year on costs of fuel,
trap maintenance, process cycle time,
and uniformity of product quality**

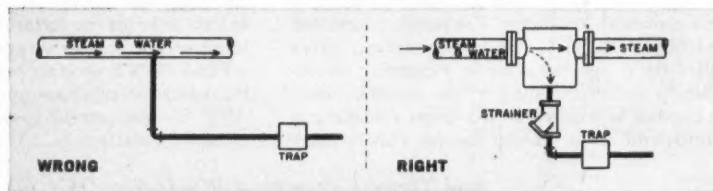
Plant and process engineers all across industry have found that Sarco *Production-Planned* steam trapping can pare operating costs by thousands of dollars a year.

Production-Planned steam trapping is an engineering approach to the problem of getting full design values of heat transfer from steam using equipment. Scores of case histories show that it can make substantial savings and improve processing efficiency. At the same time, costly trap maintenance can be greatly reduced.

In Sarco *Production-Planned* steam trapping, traps are matched to the job by *type* as well as size. They are properly placed, correctly installed. And, to keep down maintenance and replacement costs, every trap is top-quality.

It may pay you well to take this engineer's-eye view of *your* steam trapping. And why not have a Sarco representative look over your system with you? His suggestions will be completely objective because Sarco—and only Sarco—makes a steam trap for every basic require-ment. Quality? Recognized everywhere for half a century.

Production-planned systems make best use of traps



As the two illustrations above show, correct application of steam traps is as necessary as using the right trap. In the hook-up on the left, the lack of a condensate collection point plus the long leg to the trap will result in condensate's flowing past the drain point, possibly causing water hammer. The correct way to install the trap is shown at right, placed close to the drain point. A *strainer* should be placed before *any* trap to prevent entrance of scale or other foreign matter into the trap.

This is just one example of the way your Sarco representative can help you plan your steam system for maximum production.

Traps must be matched to job for best system performance

No single type of steam trap will perform well in all applications. Each type has a range of applications for which it is best suited. For optimum efficiency these differences must be taken into account; traps must be chosen for their operating principles as well as their size and pressure rating.

Sarco can give you impartial help in selecting traps because only Sarco makes the five basic types. With Sarco, it's simple—one source, one responsibility, for all your trapping needs.

roofing over glass fiber insulation two to four inches thick. Rigid 2 x 2 spacers, formed of pieces of glass fiber roof insulation four feet long, are placed beneath insulation so



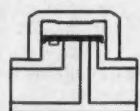
Corrugated steel-roll roofing provides low-cost, durable, insulation that is easily maintained

that steel-roll roofing covering will not unduly compress aerocor insulation.

(Cecoroll is product of Ceco Steel Products Corporation, 5601 West 26th St., Chicago 50, Illinois.)

Check 5799 opposite last page.

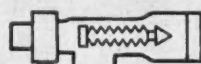
Only Sarco makes these five basic types of steam traps



Thermo-Dynamic*



Thermostatic



Liquid Expansion



Float-Thermostatic



Camlift Bucket

Take these two steps to Production-Planned steam trapping:

(1) Write today for Sarco literature; (2) Talk with your Sarco representative. He can help you check your trapping requirements, and he has—or will quickly get—the right answer to any unusual trapping problem.

*T.M.U. Pat. No. 2,817,353.

STEAM TRAPPING • AIR VENTING • TEMPERATURE CONTROLS • HEATING SPECIALTIES

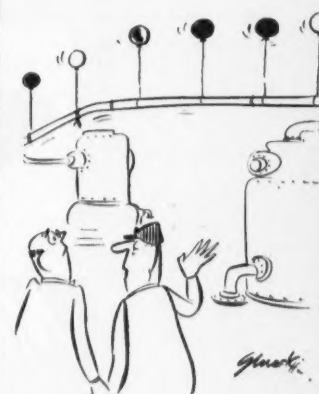
SARCO

COMPANY, INC.

635 Madison Ave., New York 22, N. Y.

Check 5798 opposite last page

5579



"It's only temporary, of course."

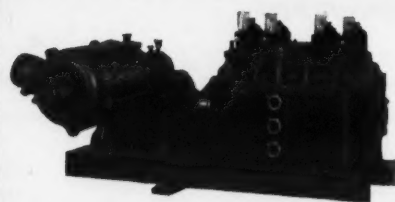
30,000 PSI? yes- from **MANZEL**

Manzel is the accepted source for lubricator requirements up to 30,000 psi. Your operations may not call for these pressures, but Manzel offers you the same outstanding dependability in its regular line of force feed lubricators. Experienced Manzel field engineers will work with you to solve any lubrication problem.



Manzel

WRITE FOR COMPLETE CATALOG giving specifications and performance requirements to meet any of your lubricator needs.



Manzel

274 Babcock Street • Buffalo 10, New York

Specialists in lubricators and metering pumps since 1898

Check 5800 opposite last page

ENGINEERING & SAFETY

Determines hazardous concentrations of lead vapors

Test kit permits on-the-spot measurement

Hazardous concentrations of poisonous lead vapors in occupational areas are easily determined with detector kit. Spot-test color comparisons reflect concentrations of lead either below or above the maximum allowable concentration of 0.20 milligrams per cubic meter. Test kit assembly is contained in a lightweight portable aluminum case which suspends from a shoulder strap to waist height.

(Lead-vapor test kit is product of Mine Safety Appliances Co., 201 North Braddock Ave., Pittsburgh, Pa.)

Check 5801 opposite last page.

Easy lap flange specs

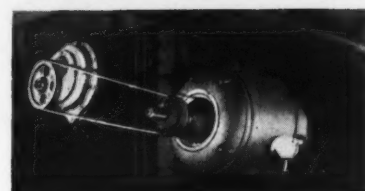
Design specifications for slip-over lap flanges for pressure vessels now can be determined without use of lengthy formulas and mathematical calculations. Jobs formerly requiring days of study and estimation can be done in hours. Manual of 33 pages, which provides easy method of determining lap flange specifications, consists of graphs, step-by-step guide for using graphs, and definitions of terms. To obtain Manual Sheet M-1, remit \$1.25 direct to Manufacturing Chemists' Association, Inc., 1625 Eye St., N.W., Washington 6, D. C.

Check 5802 opposite last page.

First pump standards now ready for ASA consideration

Estimated possible savings of \$7 million to industry

An estimated savings of approximately \$7 million could be realized by the adoption of voluntary standards for certain classes of centrifugal pumps. A committee of the American Standards Associa-



- Eliminates Motor Bases... Rails ... Supporting Structures... Shaft Couplings
- Ends Alignment Problems

Provides a compact, space saving power transmission unit for countless industrial applications. Easily installed direct to driven shaft. Mounts vertically or at any angle. Affords infinite speed ratios through use of variable speed pulleys or by changing sheaves, sprockets or prime mover speed. Simple adjustment of rod and turnbuckle maintains proper belt tension.

18 models:

Single reduction types... 98% efficient... 4.5:1 nominal speed ratio.

Double reduction types... 96% efficient... 14.7:1 nominal speed ratio.

Horsepowers: fractional to 120.

Output speeds: 8 to 425 rpm.

Hollow shaft sizes: 1 1/16" to 5 15/16" (maximum)... bushings available to accommodate smaller shafts.

Roller backstop: available where protection against reversal of direction is required.

Torque reaction bracket: furnished for units with platform-mounted or reversing drives.

Request Catalog R-58 for complete information. Give application data for specific recommendation.

LOVEJOY FLEXIBLE COUPLING CO.

4808 W. LAKE ST. • CHICAGO 44, ILL.

Check 5803 opposite last page

CHEMICAL PROCESSING

ENGINEERING & SAFETY

tion has been working on such a standard since 1954. The scope of the project is, "the development of standards for horizontal, end-suction, single-stage centrifugal pumps, including baseplates, suitable for use in the chemical industry. Standards will cover units in an approximate capacity range of 5 to 1000 gpm, for temperatures up to 500°F, with discharge heads not exceeding that specified for American Standard 150-lb (steel) flange. They may include any suitable material of construction."

Here are some of the aspects of the program on which basic agreement has been reached:

- 1) Dual standards will be developed for tangential and centerline discharge.
- 2) A minimum number of basic sizes for pumps, shafts, frames, housings, and baseplates should be adopted.
- 3) Basic standards should cover non-cooled pumps.
- 4) Boundary dimensions for pump, baseplate, and stuffing box will be standardized.
- 5) Hydrostatic test pressure should not be less than 1.5 times the maximum design working pressure.
- 6) Stuffing box should handle soft or mechanical seals.

Design criteria within these and other areas have been worked out and tentative standards submitted to the ASA for action. The assistance and comments of users, manufacturers, and other interested groups will be solicited so that the results of the project will represent needs and desires of broadest possible segment of those directly concerned.

Fire protection plan

Brochure of six pages points out how a company can do a complete job of protecting itself against damaging fire loss. Services available to users of manufacturer's equipment are explained. "Fire Protection Service Plan" — Technical Services Director, Ansul Chemical Co., Marinette, Wis. Check 5804 opposite last page.

**With an
eye
on
antibiotics
and
oil
wells
Pfizer
filters
with
fabric**

A filter cloth being fabricated at Pfizer's Brooklyn "tailor shop." Wellington Sears filter fabrics are used on stainless steel plate-and-frame presses, as shown in large picture, and also on rotary filters.



30" stainless steel plate and frame filter press used in an intermediate step in the purification of antibiotics.



Through a fabric in a filter pass antibiotics, pharmaceuticals and chemicals which may one day help save a life. Or fight the afflictions of old age. Or control a plant disease. Or—in the case of citric acid—help recover oil from "tired" wells. In the hands of specialists at Chas. Pfizer & Co., Inc., that fabric becomes an active tool in the highly successful mass production of their laboratory finds.

That a leading producer of antibiotics and other chemical products should assign the filter job to Wellington Sears fabrics is still another sign of how importantly fabric figures in industry's plans. And it is logical that organizations with first-hand understanding of research and experience should turn to Wellington Sears, to make use of more than a century of experience in serving the textile needs of industry. If you have a problem related to fabrics, in filtration, rubberizing, coating, laminating, or any combination of textiles with other materials, we'll be glad to help. And for a useful booklet, write Dept. M-6, for "Fabrics Plus," or "Filter Fabric Facts."

Wellington Sears *FIRST In Fabrics For Industry*

Wellington Sears Co., 65 Worth St., New York 13, N. Y. • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis



Check 5805 opposite last page

dispensing flammable and corrosive fluids? *Get Protection Now!*

Only Eco offers a stainless steel chemical faucet that is fume-tight and spring-loaded with TEFLON® seals. This outstanding design—approved by Factory Mutual—assures you of positive and immediate shutoff . . . instantaneous full flow. Check your chemical dispensing faucet now and make sure that costly after-drip and leaking are eliminated. Be safe . . . get full efficiency and eliminate maintenance problems now. Write or call your Eco representative, or contact the factory for additional information. *Teflon—DuPont trademark



- NON-LEAK
- NON-DRIP
- INSTANTANEOUS FULL FLOW
- POSITIVE AND IMMEDIATE SHUT-OFF

APPROVED BY

FACTORY
MUTUAL

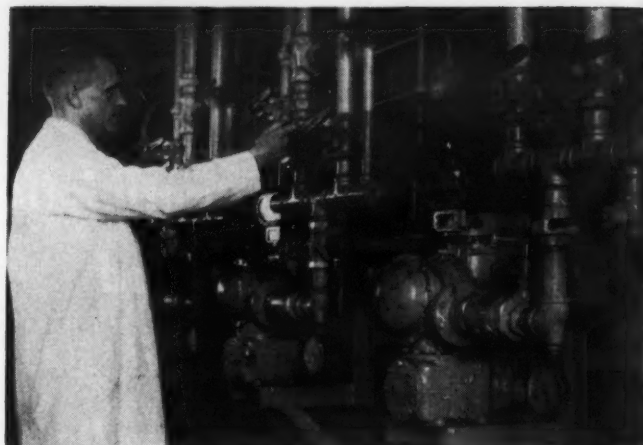


ECO ENGINEERING DIVISION ECONOMY FAUCET CO.

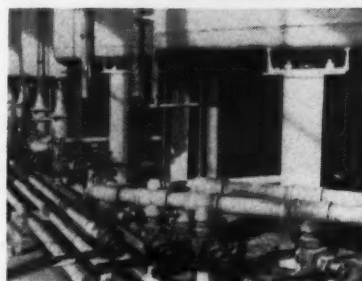
ECO ENGINEERING CO.
12 NEW YORK AVE.
NEWARK 1, N. J.
PHONE: MARKET 4-6565

EXPORT OFFICE
EMPIRE STATE BLDG.
NEW YORK 18, N. Y.

PLANT ENGINEERING MAINTENANCE & SAFETY



Photos By CP Staff



Stencil-coating components are metered to production. Indicating handle of plug valve assures right solution is being transferred

Compact, multi-way valves simplify transfer system. Straight-through flow means easy cleaning

Handling of multi-component liquid system, needed for stencil-coating solutions at A. B. Dick Company, is made contamination-free and more compact by . . .

easily cleaned plug valves that simplify flow control

THEODORE W. WETT
Assistant Editor

With WALTER KUPCHICK
Plant Engineering Section Manager
A. B. Dick Company
Chicago, Illinois

Problem: Varying stencil-coating formulations requires frequent changes in solvent, oil, and certain colored components in A. B. Dick Company's stencil-coating department. Lines are flushed with solvent and blown clear with N₂ when a color change is made. It is imperative that all

color be removed.

Stencil-coating solution is coated on tissue to form the stencil sheet. Solution is formulated from nitrocellulose, ether or alcohol solvents, mineral oils, waxes, and coloring material. To meet rigid quality standards, it is important that each formulation be separated completely. Since all solutions are pumped through same lines, these lines must be cleaned thoroughly.

As with any liquid system, tight shut-off is required, ease and dependability of operation important.

Check 5806 opposite last page

Solution: A. B. Dick Company installed one-, two-, and three-way, brass, non-lubricated plug valves to handle various solutions used in coating formulation and transfer. Positive drop-tight seal is given by Cam-Seald action of two inclined planes. When brought together by a turn of plug in closing direction, planes press seating surfaces of plug and body firmly together. Movement in opening direction relieves pressure and permits free turning.

Position of plug ports is shown at a glance by grooves in top of stem. Bottom and cap are sealed to prevent leakage to outside of valve.

Results: Versatility and compactness of multi-way valves has permitted simplification of valving. Straight-through flow, with no cavities or pockets, makes cleaning of lines easy and certain. A further safeguard against possible contamination of one formulation with another is indication of flow direction shown on end of valve stem.

Units have given leak-tight, dependable service since their installation several years ago, without galling or sticking. Only maintenance necessary has been occasional replacement of packing.

(Plug valves are a product of Homestead Valve Manufacturing Co., Coraopolis, Pa.)

Check 5807 opposite last page.

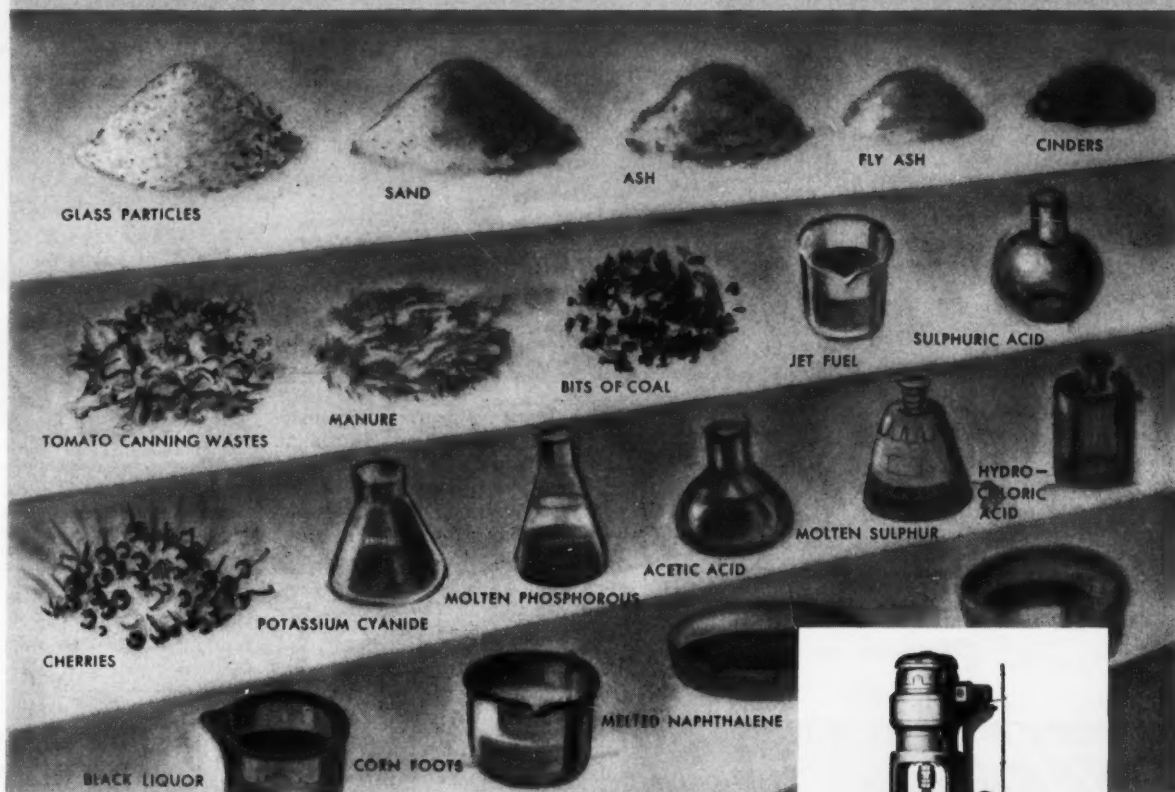
Safe air-powered pump dispenses thinners and solvents

Uses: Pumping paint thinners, solvents, and all similar fluids direct from original drums to point-of-use.

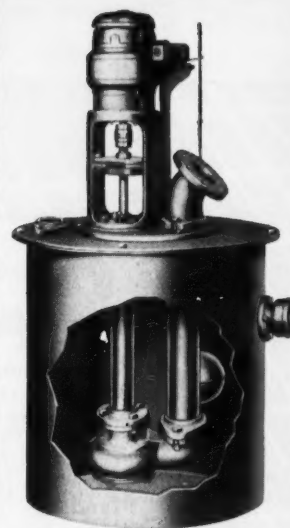
Features: Being air powered, pump is spark free and safe. Drums of solvent may be located outside or in separate, fireproof room. Pump is conveniently mounted on wall inside building for easy access and protection.

Description: Unit has a 1:1 ratio. Suction tube is easily inserted in drum bung. Packings are plastic-impregnated leather, and fluid-supply hose

CUSTOM-BUILT TO PUMP ALMOST ANYTHING



Above, you see some of the usual, and not so usual, materials that are moved at low cost every day by Yeomans vertical wet pit pumps. Many are economically pumpable only because Yeomans adapts pumps to the job environment . . . not vice versa. We make all kinds of pumps, but for a lot of tasks requiring 15 to 5000 g.p.m., you can't beat a Yeomans vertical wet pit pump. It saves space. It's self-priming. It's easy to service. It's the cost-saving way to convey a wide variety of materials in processing and waste handling. Yeomans vertical wet pit pumps cost a little more, but their extra long life is worth it. Mail the coupon below. It will bring you complete information on these pumps, plus the engineering help and field service that back them up. Or for information in a hurry, see Sweet's Catalog—Plant Engineering and Industrial Construction Files.



YEOMANS VERTICAL WET PIT PUMPS FOR INDUSTRY



Manufacturers of pumps for: drainage • processing • sewage • condensation return • water supply and circulation • also equipment for treatment of domestic and industrial wastes.

YEOMANS, 2003-5 N. Ruby Street, Melrose Park, Illinois.

Please send me the catalog on Yeomans Heavy-Duty Vertical Wet Pit Pumps for . . .

Name _____

Company _____

Street _____

City _____ Zone _____ State _____

☐ solids-free liquids

☐ solids-bearing liquids

Check 5808 opposite last page

OUTLAST
ordinary gloves
up to 14 to 1

SURETY SURESEAL
INDUSTRIAL GLOVES

What a combination to beat the high cost of safety and service. Turn-Cuffs keep dangerous liquids away from arms and inside of gloves and Sure-seal withstands more chemicals, oils, acids and solvents than any material we know. Top jobbers stock them or we will arrange a use test at our expense—write today.

THE SURETY RUBBER CO.
CARROLLTON, OHIO

In Canada: Safety Supply Co., Toronto

Check 5809 opposite last page

Safe—Rigid
Tri-Forged

GRATING

Forge welding double triangular-shaped cross bars to the bearing bars adds rigidity and safety to Dravo 1-W-4 Tri-Forged Grating.

Solid one-piece construction. Standard opening between bearing bars is 1". Cross bars are 4" center to center. Safe, smooth weld eliminates dirt-catching corners.

For information, write Dravo Corporation, Dept. D-2706, Pittsburgh 22, Pa.

DRAVO
CORPORATION

Check 5810 opposite last page

ENGINEERING & SAFETY

is solvent resistant. Pump automatically starts or stops when operator opens or closes spigot or valve at point of dispensing.

(Air-powered pump is available from Gray Company, Inc., 1094 Sibley St., N.E., Minneapolis 13, Minnesota.)

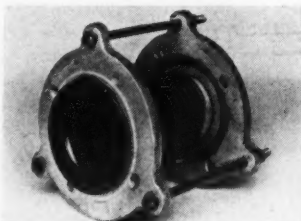
Check 5811 opposite last page.

Molded Teflon bellows— twice burst strength, 20 times flex life

High-density virgin Teflon
molded not machined

Uses: Absorbs expansion and contraction, misalignment, and vibration in piping systems, pumps, reaction vessels, valves, towers, storage tanks, etc.

Features: Bellows have



Molded of high-density virgin Teflon, bellows have twice burst strength and 20 times flex life of conventional type

twice the burst strength and 20 times or more flex life of conventional bellows machined from Teflon cylinders.

Description: Teflon bellows are molded of a patented, high-density virgin Teflon compound. They cover both low- and medium-pressure service. Bellows have dynamic working pressures as high as 120 psi, full vacuum service, bending deflection up to 70°F, and axial movement to 2". Unaffected by all chemicals except molten alkali metals and fluorine at elevated temperatures and pressures, bellows withstand temperatures as high as 450°F.

(Fluoroflex-T molded bellows are product of Resistoflex Corporation, Roseland, N. J.)

Check 5812 opposite last page.

this **NO-COST TEST**
has **CONVINCED** thousands
... send for YOUR FREE
"TEST CAN" of C-5 "hi-temp"
ANTI-SEIZE THREAD COMPOUND!

FEL-PRO
C-5
"HI-TEMP"
THREAD COMPOUND
GUARANTEED

Try C-5 and see why leading refineries, manufacturers and power producers have made it part of their regular preventative maintenance program.

"HIGH-TEMP"

- ✓ Ends Seizing and Galling even up to 1800°F.
- ✓ Reduces Wrench Torque
- ✓ Ends Stud Breakage
- ✓ Permits Repeated Re-use
- ✓ Speeds Assembly and Disassembly
- ✓ Protects Stainless Steel at all Temperatures

1614-CR

ANTI-SEIZE THREAD COMPOUND

C-5's exclusive colloidal copper formula separates mating metal threads and surfaces with cushioning, protective copper plating. C-5 prevents galvanic action and eliminates pitting even when dissimilar metals join. On mating metal surfaces, C-5 saves gaskets and countless man hours.

WRITE TODAY... For Your FREE Test Sample Can of C-5.

FELT PRODUCTS MFG. CO.
Dept. 54, P.O. Box 8609,
Chicago 80, Ill.

Check 5813 opposite last page

HOW OXY-CATALYST SYSTEMS STOP INDUSTRIAL AIR POLLUTION— RECOVER WASTE HEAT



**New brochure gives
facts and figures on
typical installations—
send for your free
copy now!**

Oxy-Catalyst Systems for air pollution control and waste heat recovery are one of the most important and most effective solutions to these problems ever developed. Engineered to your individual requirements, they can clean up close to 100% of combustible pollutants and odors. They can also recover the waste heat in process exhaust gases; and they can often do both at once.

This new brochure tells how Oxy-Catalyst installations have stopped air pollution—often at an actual saving—in a wide range of industries. If air pollution is a problem in *your* operations, write for your free copy now.

OXY-CATALYST, INC. WAYNE 7, PA., U.S.A.

Catalysts for fume and odor elimination, air pollution control, and waste heat recovery

Please send me your new brochure on Oxy-Catalyst Systems for air pollution control and waste heat recovery.

Name _____

Firm _____

Street _____

City _____ Zone _____ State _____

Check 5814 opposite last page

**Immersible motor
flange-mounted,
easily used**

Uses: Unit designed for close-coupling to agitators or pumps in sewage sumps, chemicals, water, and abrasive industrial oils.

Features: Flange-mounted motor eliminates many connecting components such as intermediate bearings, couplings, shafting, special bases, etc.

Description: Immersible motor shaft is directly at-



Flange-mounted immersible motor eliminates many connecting components

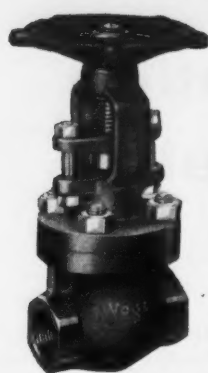
tached to impeller. Motor and pump can be raised and lowered into position together by means of motor's lifting lugs. Having leak-tight construction, motor also has neoprene breathers, oil-filled at factory, waterproof cable connection, compact design, and corrosion-resistant parts. It is available in ratings of $\frac{3}{4}$ to 40 hp, both single and poly-phase.

(Immersible motor is manufactured by The Louis Allis Co., 427 East Stewart St., Milwaukee 1, Wis.)

Check 5815 opposite last page.

Presents pump data

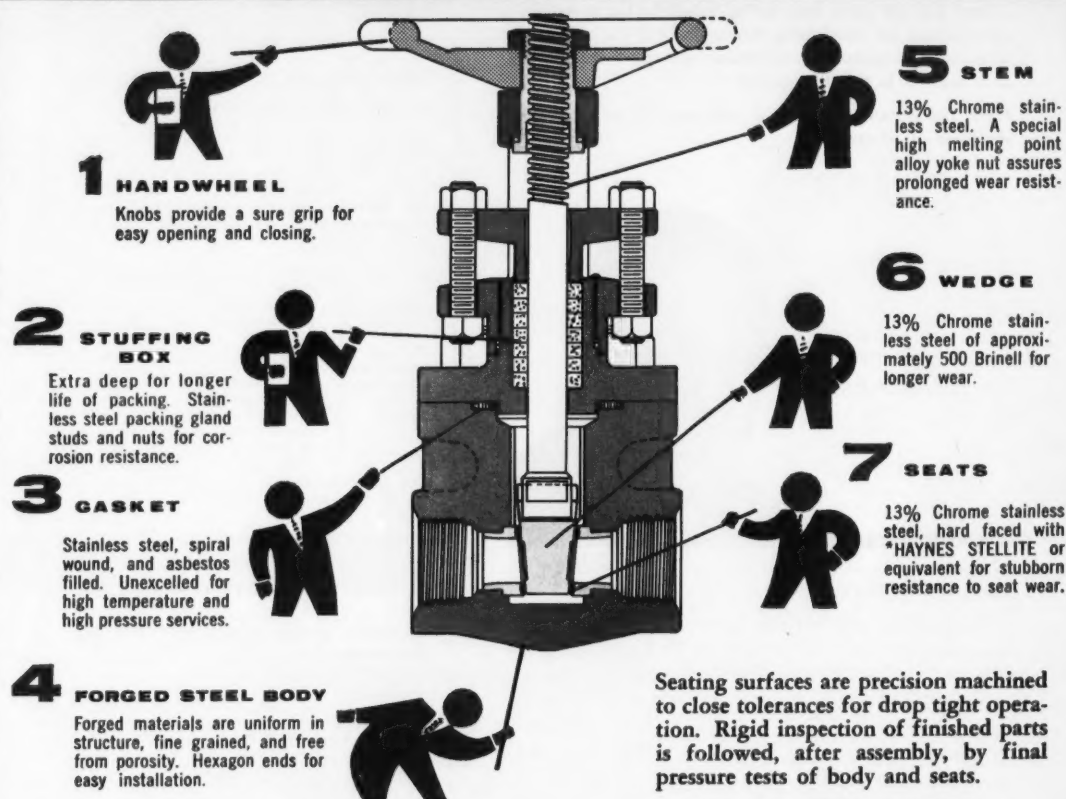
Manufacturer's bulletin of 12 pages on rotary positive-displacement pumps provides complete analysis of performance characteristics, corrosion resistance charts, and specifications. Bul TLP-57 — Manton-Gaulin Mfg. Co., Inc., 44 Garden St., Everett 49, Mass. Check 5816 opposite last page.



150-800 POUNDS SERVICE
2000 POUNDS COLD, W.O.G.
SIZES $\frac{1}{4}$ " THRU 2"

A NEW **Voegt**

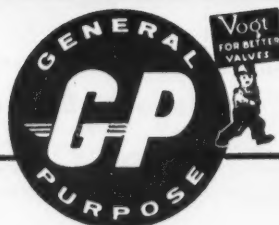
with
7 superior features



*Trade mark of Union Carbide Chemicals Co.

Address Dept. 24A-FCP.

Voegt



HENRY VOGT MACHINE COMPANY, Louisville, Ky.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati.

FORGED STEEL

VALVES

Check 5817 opposite last page

Can ^{specialized} business publication advertising actually sell?

By reputation, salesmen are reluctant to credit anything but their own selling efforts for getting names on the dotted line.

Actually, it's quite a different story. The most successful salesmen will tell you two important things about selling. 1. That the selling process is largely a matter of communicating ideas. 2. And that specialized business publication advertising can help importantly to register information with prospects.

Of course each salesman will express this in his own way ... but they all agree that selling would be far more difficult without the advertising that appears in the industrial, trade, and professional publications that serve the specialized markets to which they sell.

Here, for instance, is what a salesman has to say about this kind of advertising:

William W. Cox
AMP, Incorporated
sells to industry



Says Mr. Cox:

"The quickest way we can introduce a product is by introducing it through advertising in business papers. That way we get it around faster than we can by word of mouth alone. On occasion my home office has inquiries out to me before I can get to the customer or prospect to introduce a new product. They've already seen it in a trade magazine.

"It's interesting to note that within the last two weeks I received a survey which shows about 80% of the new customers we get on our books come through our trade publication advertising. Of course, our company is only 15 years old and we have grown from what you might say, *nothing*, to the biggest in our business. Certainly a lot of that has come from our advertising campaigns. Our name is known throughout the world right now, purely because of our advertising program. When I go to a prospect now, they know my company, they know my product... it makes

my job easier, and opens doors when I have to make cold calls."

Ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

How salesmen use their companies' advertising to get more business

Here's a useful and effective package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet entitled, "How Salesmen Use Advertising in Their Selling," which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' advertising.



You'll find represented many interesting variations in how they do this. Some are very ingenious; all are effective. You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods.

The coupon is for your convenience in sending for your free copy. Then, if you decide you want to provide your salesmen with additional copies, they are available from NBP Headquarters in Washington, at twenty-five cents each. Or if you choose you can reprint the material yourself and distribute it as widely as you please. But first, send for your free copy.

NATIONAL BUSINESS PUBLICATIONS, INC.
Department 4D
1413 K Street, N. W.
Washington 5, D. C. STerling 3-7533

Please send me a free copy of the NBP booklet
"How Salesmen Use Advertising in Their Selling."

Name _____
Title _____
Company _____
Street Address _____
City _____ Zone _____ State _____

National Business Publications, Inc.



... each of which serves a specialized market in a specific industry, trade or profession.

ENGINEERING & SAFETY

Steel 'floating bridge' extends protection to the foot

Uses: Foot protection in working applications where simple toe protection is not considered adequate.

Features: Three independent steel plates overlap up the front of this safety shoe to extend toe protection to entire forepart of the foot. Steel "floating bridge" over balljoint flexes with foot permitting normal walking comfort. Extended wing protects small toe area.



Steel foot protection still permits normal walking comfort

Description: Balljoint and instep shields have a tough vulcanized neoprene coating that resists severe abrasion. Instep-shield buckles over lacing and cannot be removed from the shoe. Outsole and heel are neoprene-cork for skid and oil resistance. Shoe is available in widths D and E, sizes 8 to 13.

(Stock No. 1518 safety shoe is a product of Lehigh Safety Shoe Co., Emmaus, Pa.)

Check 5819 opposite last page.

Plastic pipe, accessories

Manufacturer's eight-page bulletin contains technical data, shapes, sizes, and prices on Saran rod, sheet, tape, pipe, and fittings carried in stock. Bul SPP-557 — Pyramid Plastics, Inc., 554 W. Polk St., Chicago 7, Ill.

Check 5820 opposite last page.

ENGINEERING & SAFETY

Paint can withstand thermal shock of 1000°F

Graphite silicone coating
will not crack, or peel

Uses: For coating applications in chemical, steel, and natural gas industries.

Features: Capable of withstanding violent thermal shock of 1000°F range, coating will not crack, peel, or bubble.

Description: Paint is claimed to be first graphite silicone coating ever developed. It is manufactured in two colors, black and aluminum. Coating is a silicone alkyd vehicle paint for use on heated surfaces to 1100°F. Formulation: pigment, 26.0%, vehicle 74.0%. Pigment: Aluminum paste 100%. Vehicle: Silicone alkyd vehicle 46.0%, thinner & drier 54.0%. Weight per gallon is 8.6 pounds.

(Thermocone is manufactured by Joseph Dixon Crucible Co., 167 Wayne St., Jersey City 3, New Jersey.)

Check 5821 opposite last page.

Phosphate conditioner retains composition in water at 100°C

Harmless to all metals;
prevents corrosion

Uses: Conditioner prevents precipitation of calcium and magnesium salts in water. It also forms inert complexes with certain metallic ions in water such as iron, copper, nickel, manganese, and zinc.

Features: There is no chemical breakdown in water temperatures up to 100°C. Conditioner is harmless to all metals and equipment; prevents corrosion.

Description: Product is a water-soluble complex phosphate of standardized composition. pH of 1% solution in water is 7.1. Solubility is 150 parts in 100 parts of water at 70°F.

(Karlsonite phosphate water conditioner is product of Stiles Karlsonite Corporation, 1550 Grand Ave., Waukegan, Ill.)

Check 5822 opposite last page.

GUTS!

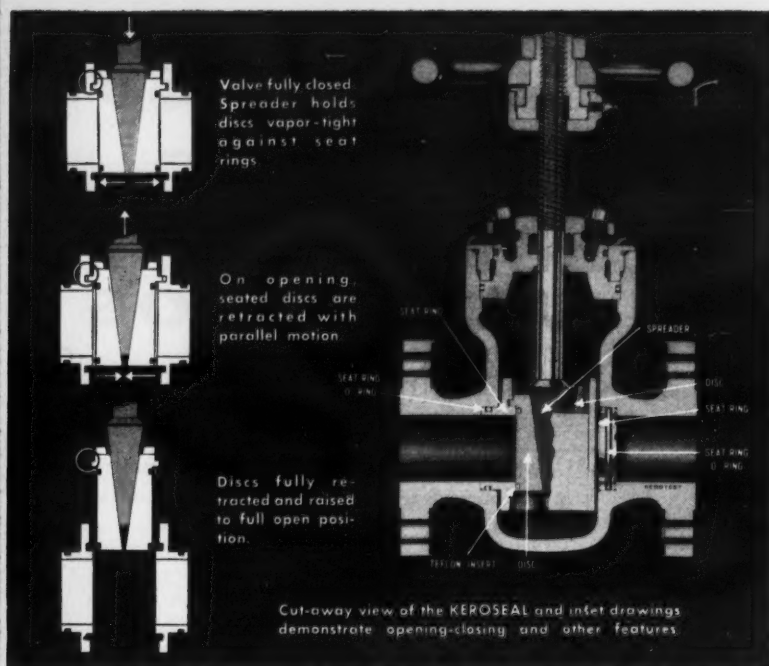
no other pipe insulation
stands up like

**tough
UNIBESTOS**
to save replacement
and maintenance costs

UNIBESTOS® won't shatter from hammer blows . . . is undamaged by fumes, water, or moisture . . . yet cuts and fits easily — goes on quickly — may be removed and reused time after time without damage or loss of efficiency. Sizes to 44" o.d.; single-layer thicknesses to 5". The whole cost-cutting story is yours for the asking. There's only *one* UNIBESTOS!



Check 5823 opposite last page



Where can you use the **New KEROSEAL®** Valve?

More than two years of laboratory and field testing prove that the new KEROSEAL offers advantages not found in any other valve. These include the following:

- It is vapor-tight, mechanically sealed
- Non-lubricated
- It provides optional direction of flow
- Full opening
- It is designed to handle gases, petroleum products, petrochemical fluids

Where can you use the KEROSEAL? We invite your inquiries and will gladly discuss your problems in full.



**KEROTEST
MANUFACTURING
COMPANY**

Kerotest Cast Steel Valves Are Manufactured and Distributed in Canada Exclusively by Guelph Engineering Company, Guelph, Ont.

New KEROSEAL Bulletin available on request

KEROTEST MANUFACTURING COMPANY
2518 Liberty Avenue, Pittsburgh 22, Pa.

Gentlemen: DATE _____ 1958
We are interested in the possibility of using KEROSEAL. The fluid is _____, under pressure of _____ psi (or psig) and a temperature of _____ ° C.(F.) We understand we are under no obligation in requesting full information.

NAME _____ POSITION _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

Check 5824 opposite last page

ENGINEERING & SAFETY

Dacron work clothes for H_2O_2

Industrial apparel of 100% Dacron has been recently introduced. Besides being highly resistant to damage by acids and other corrosives, the clothing is particularly resistant to concentrated hydrogen peroxide.

Shirts, pants, laboratory coats, and coveralls maintain their high tenacity and tensile strength even after eight hours of immersion in 90% concentrated hydrogen peroxide at room temperature. Clothes resist wrinkles, wash easily, need little or no ironing, and are light and comfortable.

(Dacron work clothes are product of Dept H, Worklon, Inc., 253 W. 28th Street, New York 1, N. Y.)

Check 5825 opposite last page.

Teflon bonding needs for almost all uses met by adhesives

Uses: For bonding of treated Teflon to wood, steel, glass, aluminum, copper, ceramics, plastics, or any other material bondable with adhesive.

Features: Materials meet requirements for strength, chemical resistance, flexibility, and temperature resistance for practically all Teflon bonding applications.

Description: R-86004 is recommended where maximum chemical resistance is required. It is a thermosetting, two-component adhesive which can be cured at room temperature.

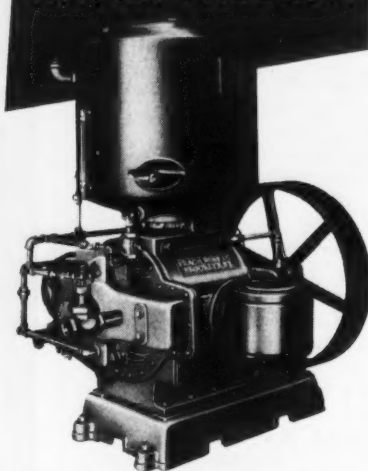
R-86024, also a thermosetting, two-component adhesive, is recommended for economical bonding of Teflon for dry applications.

R-81001 is a thermosetting adhesive recommended for bonds that must endure heat or must be flexible.

(Ray-Bond R-86004, R-86024, and R-81001 are products of Adhesives Dept., Raybestos-Manhattan, Inc., Bridgeport 2, Connecticut.)

Check 5826 opposite last page.

THE ANSWER TO YOUR WATER PROBLEM



BEACH-RUSS Vapor Purge Pumps

Stop Internal Vapor Condensation

... Improve Efficiency on Moist Circuits

Beach-Russ "Vapor Purge" pumps are designed to give highest efficiencies on moist circuits. Condensate gases are controlled so that it is impossible for the vapors to condense in the pump itself and impair its efficiency.

Beach-Russ "Vapor Purge" pumps are available in a range of capacities from 20 to 1800 C.F.M. Our sales engineers will be glad to assist you in selecting the pump to meet your specific vacuum needs.

Write for "Vapor Purge" Pump Literature.

BEACH-RUSS COMPANY
50 Church St. • New York 7, N. Y.
Address Department 46

Check 5827 opposite last page

CHEMICAL PROCESSING

DATA SAVERS!

CP's Processing and Engineering Data Section is for you!

Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations.

They have been sent to us by our many readers.

Perhaps, you will find them to be of value to you.

A wide variety of information can be found in this section. So, no matter what your particular field you will find suitable data to aid you in your daily work.

And —

the section pages are designed to fit easily into regular data files.

Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebook.

So —

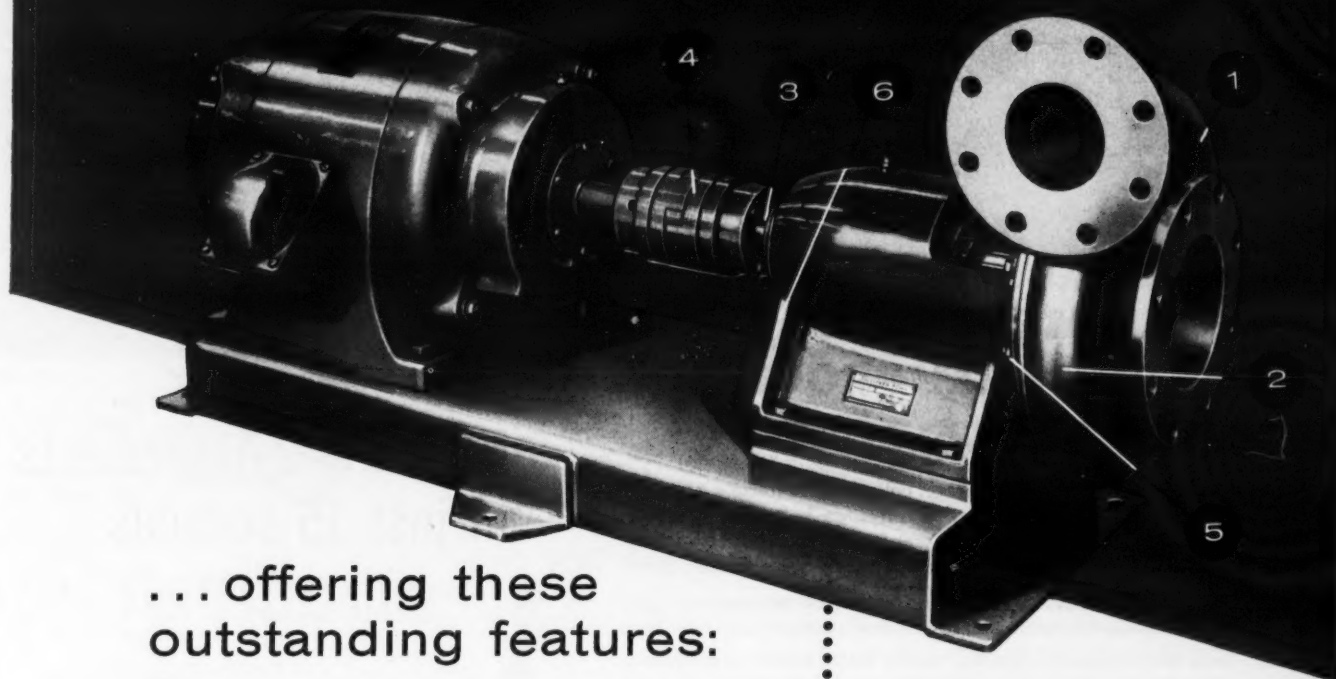
be sure not to miss this month's "Data" Section. It begins on page 103.

For more information on product at right, specify 5828 see information request blank opposite last page.



TRI-CLOVER

presents an *ALL-NEW* series of
INDUSTRIAL Centrifugal PUMPS
for dependable corrosion-resistant service



... offering these outstanding features:

1. *Volute type case* . . . specially designed heavy duty pump head gives maximum conversion of velocity to pressure energy, with high efficiency. Pump head swings 360 degrees.
2. *"Francis" type impeller* . . . produces lower pressure at shaft sealing surface—minimizes danger of impeller clogging.
3. *Precision-machined shafts* . . . minimize possibility of deflection or vibration. Over-sized ball bearings insure long, trouble-free operation.
4. *Spacer type coupling* . . . allows removal of complete pump rotary assembly, including impeller and frame, without removal of base or disturbing piping or electrical connections.
5. *Exclusive backplate design* . . . accommodates either packing gland or mechanical seal stuffing boxes, which can be easily interchanged in the field.
6. *Rigid one-piece frame* . . . of cast iron, has oversized pocket for collecting any leakage from stuffing box, and can be piped to drain away from pump.

For over 35 years, Tri-Clover Division has specialized in the development and manufacture of high quality corrosion-resistant centrifugal pumps. Now, to further extend this pump line, and to meet more highly specialized pumping requirements, Tri-Clover presents an entirely new series of high efficiency centrifugal pumps.

This new series of Industrial Stainless Steel Pumps is offered in a full range of sizes and seal styles, including models to operate at temperatures of minus 80° F to plus 400° F.

SEND FOR BULLETIN

For the full story on these new pumps, write for a copy of the new Pump Bulletin 258-I.



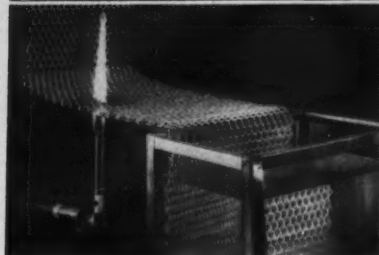
LADISH CO.

Tri-Clover Division
Kenosha Wisconsin

TRI-CLOVER

In Canada: Brantford, Ontario
Export Department
8 So. Michigan Ave., Chicago, U.S.A. (Cable TRICLO)

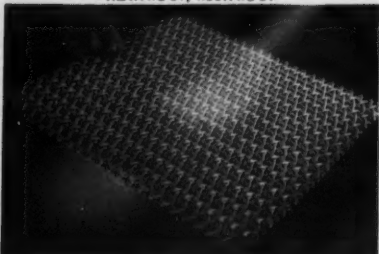
Cambridge WOVEN WIRE BELTS



HEATPROOF, RUSTPROOF



FLASH DRAINAGE



FREE CIRCULATION



NO SEAMS OR LACERS

METAL-MESH BELTS GIVE FAST, UNIFORM PROCESSING AT LESS COST

Whether you process slab, sheet or pelletized materials through wet, dry, hot or cold operations, Cambridge belts can combine movement with processing to give you increased production, and higher product uniformity at lower operating costs. Here's how:

CONTINUOUSLY MOVING BELTS ELIMINATE BATCH PROCESSING—give faster, less costly production; reduce slow, costly manual handling.

OPEN MESH PROVIDES FREE AIR, LIQUID CIRCULATION—atmospheres and solutions circulate through the belt and around product for fast, uniform processing, flash drainage. Close mesh can't mar or mark soft slab or sheet products.

ALL-METAL CONSTRUCTION IS HEATPROOF, COLDPROOF, RUSTPROOF—Cambridge Belts can be woven from any metal or alloy to take up to 2100° F. or sub-zero temperatures, yet remain impervious to attack from water, acids or caustic solutions.

SPECIAL SURFACE ATTACHMENTS AVAILABLE—raised edges and cross flights to keep product on belt during movement.

Currently, Cambridge Belts are used in the chemical industry for such diversified operations as bagging cement, drying wool, cooling and drying polyethylene sheets, washing, rinsing and drying catalysts, tanning hides, drying coal, and processing rubber.

Talk to your Cambridge Field Engineer soon. He'll recommend the belt size, mesh or weave—in the metal or alloy best suited to your operations. You'll find his name in the classified phone book under "BELTING-MECHANICAL". Or, write for **FREE 130-PAGE REFERENCE MANUAL** giving mesh specifications, design information and metallurgical data.



The Cambridge Wire Cloth Co.

WIRE
CLOTH

METAL-MESH
CONVEYOR
BELTS

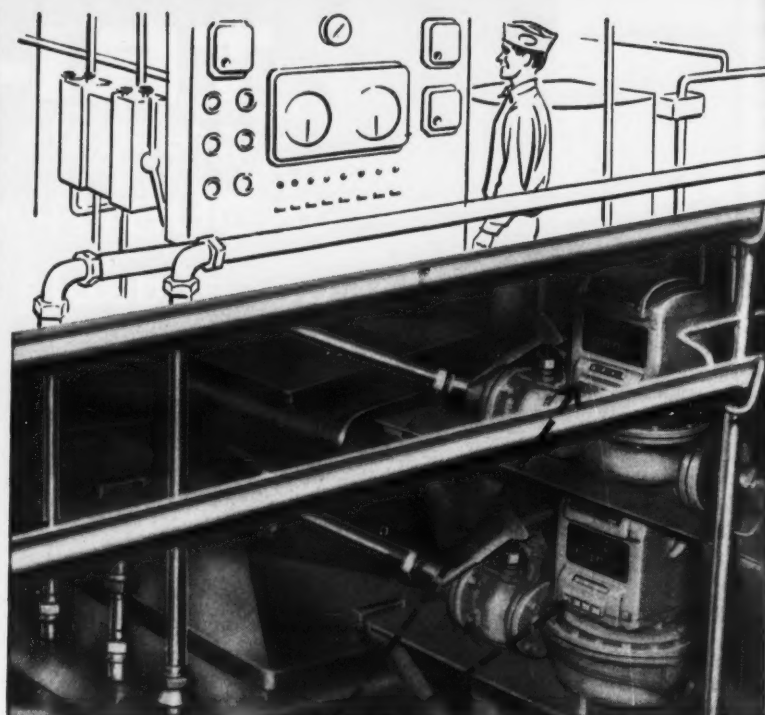
WIRE
CLOTH
FABRICATIONS

Department F,
Cambridge 6,
Maryland



OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Check 5829 opposite last page



Measure 2 ingredients in just 15 seconds with automatic accuracy

That's all it takes for a man to set quantities and open valves on the accurate Auto-Stop meters feeding two liquids to a batch. Then he's completely free to devote full time to other details. The meters shut off precisely, automatically.

Think of the time saved! All liquids measured simultaneously. No waiting for weigh tanks to fill, or "inching" up to the marks on gauge sticks. No wrestling with bags or buckets. No mess, no drip, no hazard.

And think of the materials you save! Eliminates rejected batches, prevents waste of expensive materials. You get quality control like you've never had before, and each meter has a totalizer for accurate cost and inventory control.

This Auto-Stop batching meter is only one of many Neptune meters for accurately measuring more than 150 industrial liquids... from simple water meters to ticket-printing meters, electric switch adaptations for cycling control, and specially engineered remote control systems.

Ask for free Bulletin 567- FP.



NEPTUNE METER COMPANY

19 West 50th Street, New York 20, N. Y.



Branches ATLANTA • BOSTON • CHICAGO • DALLAS • DENVER • LOS ANGELES
in: LOUISVILLE • No. KANSAS CITY, Mo. • PHILADELPHIA • PORTLAND, ORE.
SAN FRANCISCO (Millbrae) • IN CANADA: TORONTO 14, ONT.

Check 5830 opposite last page

CHEMICAL PROCESSING



recent books

reviews of current technical and reference work
... summarized for you by authorities in the
field with the CP staff

Cosmetics Science and Technology

In this massive volume of more than 1450 pages, 61 experts on all phases of cosmetic technology discuss over 3 dozen types of cosmetics ranging from aerosol cosmetics and anti-dandruff preparations to wave sets.

The book goes into historical, definitive, legal, and testing details. It is definitely not a compendium of formulations, although it does have typical formulations for the different products described.

A detailed discussion of manufacturing layout and techniques comprises almost 200 pages.

Physiological considerations occupy about a 150-page section.

A number of annotated references follow nearly every one of the 53 chapters.

To obtain "Cosmetics: Science and Technology" remit \$25.00 direct to Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N.Y.

Check 5831 opposite last page.

Emulsions: Theory and Practice

In this latest addition to the ACS Chemical Monograph Series, Dr. Paul Becher of the Atlas Powder Company reviews modern emulsion theory and practice.

Becher discusses the facts and theories of surface chemistry relevant to emulsions, emulsion composition effects physical properties, theories of emulsion stability; and manifestations of instability, chemistry of emulsifying agents, emulsification technique, formulation data, and the commercial aspects of demulsification.

There are over 800 literature and patent references to

work published within the last 15-or-so years. The author has tried to select patent references that could properly be considered as part of the literature of emulsions, because many patents are devoid of general scientific value.

A very detailed chapter is devoted to testing of emulsion properties. Also included is a comprehensive listing of all commercial emulsifying agents, giving trade name, manufacturer, composition, and application. Total pages: 382.

To obtain "Emulsions: Theory and Practice" remit \$12.50 direct to Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y.

Properties and Testing of Plastics Materials

Designed as a handbook for those engaged in the testing of plastics, this 198-page book discusses the definitions and tests for physical, thermal, optical, electrical, chemical, and general properties.

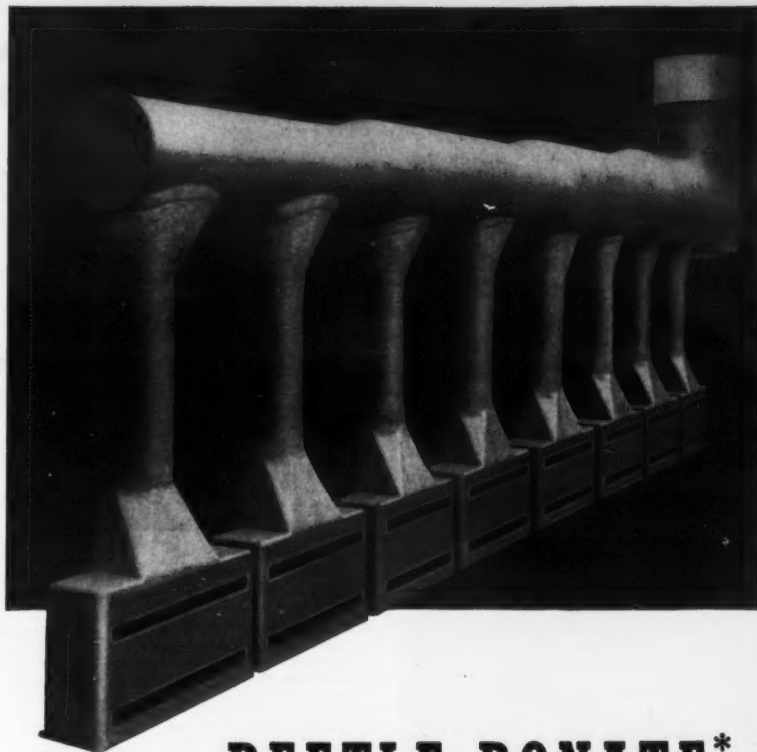
Authors A. E. Lever and J. Rhys of the National College of Rubber Technology, have covered the subject in detail, and included over 1600 references.

To obtain "The Properties and Testing of Plastics Materials" remit \$4.75 direct to Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N.Y.

Check 5832 opposite last page.

Chemistry of Natural and Synthetic Rubbers

Dr. Harry L. Fisher, former ACS president who has devoted his life to the study of rubber, presents us with this



BEETLE BONATE*

backbones the ruggedest, most-efficient vent
and ducting systems in the chemical industry

Lighter than most resin compounds, more durable by far than sheet metal, Beetle Bonate vents, ducts and hoods can take it! Proven non-corrosive, Beetle Bonate withstands constant exposure to chemical fumes or atmospheres.

Beetle makes vents, hoods, pipes and ducts from Bonate to any specifications of size or shape. Bonate equipment is simply installed without special equipment or experience.

Fully-descriptive literature and qualified engineering consultation is yours immediately upon request. No obligation, of course!

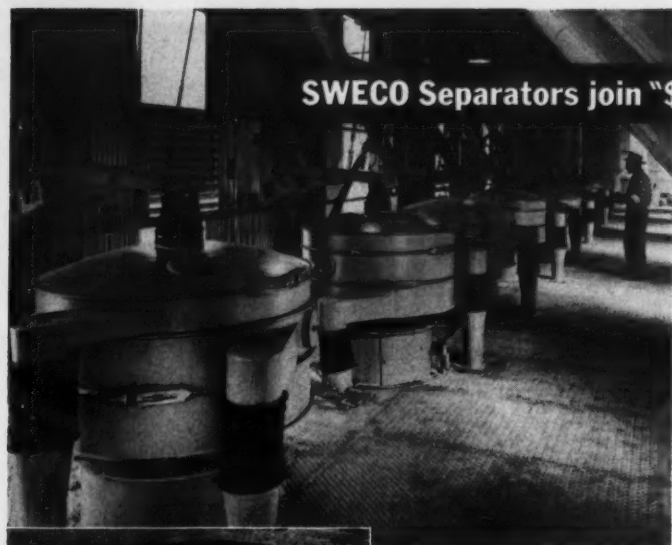
*Reg. Trademark



FALL RIVER • MASSACHUSETTS
a subsidiary of Crompton & Knowles Corporation

Check 5833 opposite last page

SWECO Separators join "\$20 Million Team" for U.S. Borax



ABOVE: Twenty-seven 48" diameter SWECO Separators used for product screening at the U.S. Borax plant.

LEFT: Airview of the plant and the world's first open-pit borax mine. SWECO's Engineering & Construction Division handled the design, engineering and procurement for the huge refinery in a joint venture with Twatts-Wittenberg Co.



Southwestern Engineering Company
4800 Santa Fe Avenue, Los Angeles 58, Calif.
LUdlow 3-6262 - Cable: SWECOLA
Engineers and Constructors . . . Manufacturers

Check 5834 opposite last page

RECENT BOOKS

factual, interestingly written 208-page volume. Not only does Dr. Fisher discuss the chemistry of natural and synthetic rubbers, but also their physical properties and uses.

The first half of the book covers the subjects of vulcanization, acceleration, antioxygenation, and natural rubber and latex. The second half covers the synthetic rubbers — their properties and raw materials, hard rubber, bonding rubber to metal, reclaiming rubber, and chemical derivatives.

Throughout the volume are interesting sidelights on the historical background behind many subjects and developments. Although the reviewer has never met Dr. Fisher, he gathers from reading through this book, that the author must be a sincere, friendly man, because this spirit has rubbed off — even in this book of technical facts.

To obtain "Chemistry of Natural & Synthetic Rubbers" remit \$6.50 direct to Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Chemistry Problems in Jet Propulsion

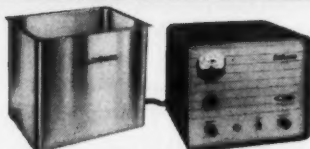
A very thorough, detailed, and technical discussion of atomic and molecular structures, thermodynamics, and chemical reactions, as applied to the fast-growing field of jet propulsion, is given in this volume.

The author, S. S. Penner, professor of jet propulsion of California Institute of Technology, has divided this 394-page volume into three sections.

The objective of the first section is to give an appreciation of modern concepts of atomic and molecular structures, as derived from application of wave mechanics. After a review of basic thermodynamics, the subject of combustion thermodynamics is treated in detail, and methods of predicting optimum performance of propellants in rocket engines are given.

The last section of the book

MAMMOTH narda SONBLASTER



G-1501 generator, NT-1505 tank.

America's first mass-produced industrial-size ultrasonic cleaner!

MAMMOTH 5-GAL. TANK \$695

Other models from \$175. 2-year guarantee on all units. Interior tank size (in.), 10W x 14L x 9½H. Tank Capacity, 5 gallons.

The Narda Model 1500 SonBlaster helps you save seven ways over costly solvent, alkaline or vapor degreasing! It cleans faster, speeds production, cuts rejects, eliminates bottlenecks! It saves on chemicals & solvents, cuts maintenance and downtime! What's more, there's no expensive installation; it saves on floor space and labor!

You get the tremendous activity of this new 200-watt Narda SonBlaster with the largest transducerized tank ever made, at the lowest price in the industry! Or, operate up to four submersible transducers from this same generator at one time, in any size or shape tank you desire.

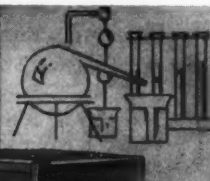
Simply plug the SonBlaster into any 110-115 V AC line, and flip the switch. In seconds, you'll clean 'most any mechanical, optical, electrical, medical or horological part or assembly you can think of. Perfect, too, for brightening, polishing, radioactive decontaminating, pickling, quenching, and plating; emulsifying, mixing, sterilizing, impregnating, degassing, and other chemical process applications. Write for more information to determine the model best for you. Address: Dept. CP-7.

The SonBlaster catalog line of ultrasonic cleaning equipment ranges from 35 watts to 2.5 KW, and includes transducerized tanks as well as immersible transducers, for use in any size or shape tank.



Check 5835 opposite last page

FOR ABSOLUTE LABORATORY UNIFORMITY...



THE Marion MIXER

... IS STILL THE LEADER

FOR MIXING:

- Dry and Semi-Wet Chemical Powders
- Agricultural Chemicals
- Materials for the Plastics Industry
- Materials for Chemical Processing Plants
- Sweeping Compounds
- Pharmaceuticals
- Fertilizers

A uniform mix is assured time after time, no matter how complicated the formula, and with laboratory exactness. If the formula is right — the MARION MIXER will mix it with complete accuracy.

THE EXCLUSIVE MARION MIXING and BLENDING ACTION will handle any type of chemical materials and give a top quality mixed product at less cost.

Send Today For Free Descriptive Literature

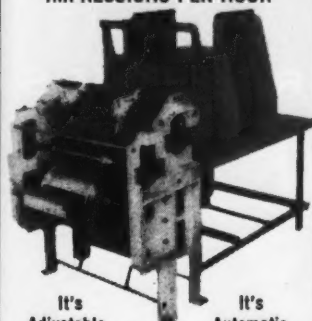
RAPIDS MACHINERY COMPANY

865 11th Street

Marion, Iowa

Check 5836 opposite last page

INPLANT PRINTS UP TO 3000 IMPRESSIONS PER HOUR



It's Adjustable #7 It's Automatic
INDUSTRIAL'S AUTOPRINTER!

For production line marking, dating and coding of multiwall bags, cartons and bulk containers.

When dependable output must be coupled with flexibility and rapid changeover, it's a perfect job for Industrial's Autoprinter.

Completely automatic and electronically controlled, the Autoprinter works right with your production line . . . at speeds up to 3,000 neat, legible impressions per hour regardless of surface variation! Saves inventory, pre-printing, storage costs. Uses interchangeable rubber type, requires minimum of attention. The Autoprinter has been engineered and built for effective performance . . . and with proper care, will give you a lifetime of service.

other INDUSTRIAL units include:

The WHIPPET Marker®



The WHIPPET Marker — for automatic low cost conveyor line marking.

The RAINBOW Trans-leaf Coder®



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RECENT BOOKS

covers chemical reactions under non-isothermal conditions in flow systems, and emphasizes the interplay between aerodynamics and chemistry.

To obtain "Chemistry Problems in Jet Propulsion" remit \$12.50 direct to Pergamon Press, Inc., 122 E. 55th St., New York 22, N. Y.

Check 5838 opposite last page.

Man-made Fibers

The previous two editions of this volume have been titled "Artificial Fibers." The name has now been changed to be more in harmony with trade jargon.

Within its 662 pages, author R. W. Moncrieff covers the regenerated cellulosic, alginic, and protein fibers, and the synthetic fibers. Significant sections of the book are devoted to covering the structure and properties of fibers and to processing details.

The book will make a very good reference volume.

To obtain "Man-made Fibers" remit \$9.75 direct to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, New York.

Check 5838A opposite last pg.

Heat Transfer

This 652-page book written by the late Dr. Max Jakob, research professor of Mechanical Engineering, Illinois Institute of Technology, is Volume II of his classic work.

Amplly illustrated with graphs, charts, and drawings, the book, in the main, deals with selected fields of heat transfer applications such as in thermometry, heat exchangers, regenerators, cooling towers, cooling by falling films, liquid metals, packed towers, and similar uses.

Two chapters are devoted to analysis and discussion of heat radiation in spaces of simple configuration.

Because of the time that elapsed between the preparation of Volume I and II (over six years), a 39-page section entitled "Supplements to Vol-

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RECENT BOOKS

ume I", has been included. This up-dates some of the material in the first volume.

Four appendixes in the book list problems for each chapter, nomenclature and symbol explanations used in the book, conversion factors, and bibliography. Answers to problems are not provided.

To obtain "Heat Transfer — Volume II", remit \$15.00 direct to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Check 5841 opposite last page.

Applied Statistics for Engineers

The latest addition to the "chemical engineering series" is this 354-page volume covering the whole field of statistics as used in engineering.

Author William Volk covers each major branch of this subject — probability, permutations and combinations, distributions, variability, analysis of variance and other statistical tests, correlation, sequential analysis of data, and nonparametric statistics.

He tries to slant the material towards the interests of the chemical engineer insofar as possible. The numerous examples are based on chemical processing industry problems.

To obtain "Applied Statistics for Engineers" remit \$9.50 direct to McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N.Y.

Money and the Chemical Engineer

Here's a book that clearly explains the economic side of chemical engineering. Written by James O. Osburn and Karl Kammermeyer, professors of chemical engineering, State University of Iowa, it covers problems and situations that the young engineer encounters almost immediately in industry. The book is written in language that he can understand.

Included in its 202 pages are sections dealing with annual

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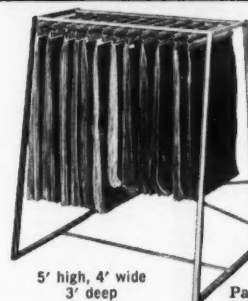
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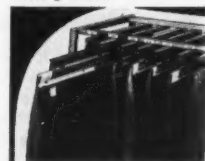
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CHEMICAL PROCESSING

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costs, recovery of an investment, designing and operating equipment for maximum profit, how to make a cost and profit estimate, replacement of equipment, choosing between alternative investments, methods used to check how profitable an operation has been, and many other aspects of financing.

The book is amply illustrated with charts, graphs, and tables. Problems (with answers) are included at end of each chapter, illustrating practical applications.

Seventy-nine references are cited for additional reading on the subject. Designed to fill a major gap in the chemical engineer's education, the book gives an excellent working knowledge of economic principles, and is highly recommended for all engineers.

To obtain "Money and the Chemical Engineer", remit \$6.00 direct to Prentice-Hall, Inc., 70 Fifth Avenue, New York 11, New York.

Check 5844 opposite last page.

Trace Analysis

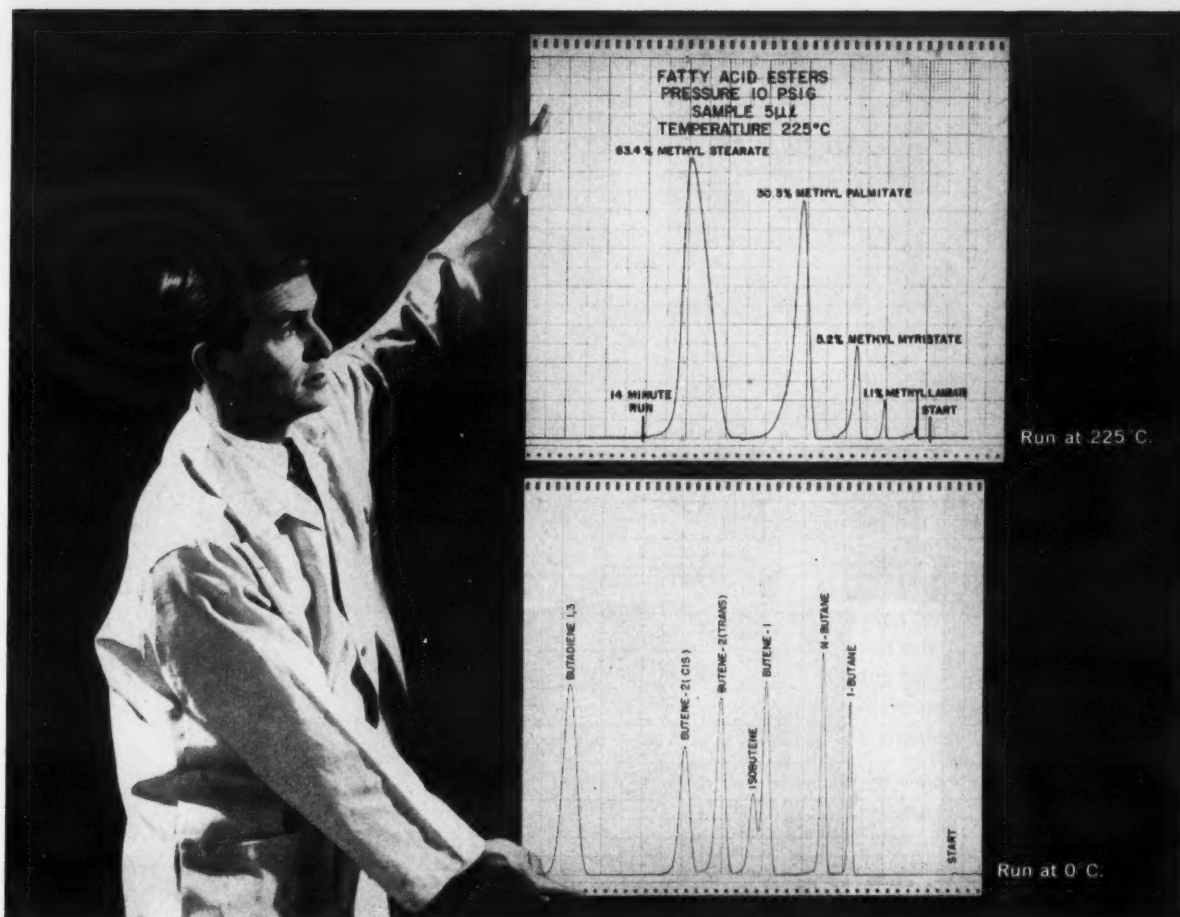
Written by 24 contributors — all recognized leaders in their respective fields of analysis — this 672-page book, edited by John H. Yoe and Henry J. Koch Jr., brings together all or most of the methods and techniques used in trace analysis.

The work is based on the first symposium devoted exclusively to the whole field of trace analysis; methodology, instrumentation, separations, concentrations, contamination hazards, and dealing with sub-microgram quantities. Each chapter is followed by a discussion, including pertinent comments from the floor made at the time of the symposium.

The papers deal with the theory, application, sensitivity, precision, accuracy, sources of error, and other factors involved in the various methods and techniques employed.

To obtain "Trace Analysis", remit \$12.00 direct to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y.

Check 5845 opposite last page.



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Natural gas	Air pollution studies
Liquefied petroleum gas	Water in organic solvents
Cylinder gases	Plastic raw material control
Combustion products	Essential oils
Refrigerants	Paints & lacquer thinners
Chlorinated hydrocarbons	Food odors & flavors
Aromatic hydrocarbons	Metabolic product analysis

INSTRUMENT DIVISION

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Check 5846 opposite last page



new literature

Industrial bulletins pertinent to the reader . . . offering data on products, processes, services. Additional reviews of catalogs, bulletins, data sheets, etc., are found throughout other sections of this magazine

Glove wall chart, selector

Illustrated, 17 x 22" two-color wall chart with an easy-to-read index displays the full line of manufacturer's industrial gloves giving all necessary specifications of each model as to material, weight, size, etc. Handy pocket folder, a glove selector check list, includes detailed performance ratings. Glove wall chart and selector check list — The Pioneer Rubber Company, 296 Tiffin Rd., Willard, Ohio.

Check 5848 opposite last page.

Infrared instruments

Infrared spectrophotometers for routine laboratory qualitative and quantitative analyses are described and illustrated in Bul 724 — Scientific Instruments Div., Beckman Instruments Inc., 2500 Fullerton Rd., Fullerton, Calif.

Check 5849 opposite last page.

Metal cladding process

Bulletin of 32 pages describes manufacture of composite metal produced by flux-free, high-strength bonding process. Available cladding and backing metals are listed. Hortonclad Bul — Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill.

Check 5850 opposite last page.

Outlines silicone use

Properties of silicones as dielectric materials are outlined in 12-page report. "Silicones as Dielectrics" — Dow Corning Corp., Midland, Mich.

Check 5851 opposite last page.



This is the new Glas-Col drum heater. It's used for melting drums of various fluid materials . . . tars, waxes, pitches, resins, etc. Just lower it down over the drum and hook up the leads. The heater is light, rugged. There are no hinges to be sprung or torn off by rough handling. The three circuits (2000 watts, 230 volts each) permit zone heating . . . to 500°F. Use one, two, or three zones depending on level of liquid in drum. No hot spots. **\$315, f.o.b., Terre Haute, Ind.** | When ordering, please specify outer diameter of drum chimes.

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Check 5847 opposite last page

NEW LITERATURE

Diesel-powered tractor

Major design advances of manufacturer's turbo-charged, diesel-powered tractor are described and illustrated in 16-page catalog which includes specifications. Cat MS-1243 — Construction Machinery Div., Allis-Chalmers Mfg. Company, Milwaukee 1, Wis. Check 5852 opposite last page.

Food irradiation reactor


Preliminary design study of food irradiation reactor selected for use in government's development of radiation system for processing 3000 lb food per hr is available. Major research, development, design, and operational problems anticipated in construction and operation of system are discussed in 98-page report. To obtain Report AECU-3320, "Preliminary Design Study of a Food Irradiation Reactor, Phase 2" — remit \$2.50 direct to Office of Technical Services, US Dept. of Commerce, Washington 25, D. C.

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Note the number in the last line of each new literature review. Check this key number on Reader Service slip opposite last page of this issue. Fill in the slip with the other pertinent information (name, title, company, address, product made). Mail to our Reader Service Department. We will contact the manufacturer for you, telling him you'd like a copy of the bulletin. He'll send it direct to you.



the OTHER Advantages of a Kinetic Seal

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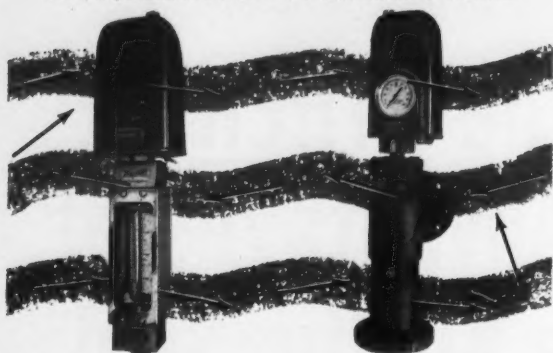
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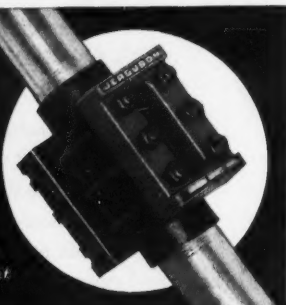
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*easily and inexpensively
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Gages and Valves
for the Observation
of Liquids and Levels

Check 5855 opposite last page

NEW LITERATURE

Corrosion-resistant filters

Catalog illustrates complete line of corrosion-resistant filtration equipment suitable for products ranging from ultra-fine pyrogen solutions to coarse prefiltered bulk chemicals. Corrosion-resistant Filter Cat — Ertel Engineering Corp., Kingston 3, N.Y.

Check 5779 opposite last page.

Teflon coatings

Manufacturer's bulletin of four pages describes Teflon coatings and lists specifications, properties, and applications. Teflon Coating Bul — General Plastics Corporation, 165 Third Ave., Paterson, N. J.

Check 5856 opposite last page.

How to select couplings

Bulletin of eight pages tells how to select flexible couplings suited to more than 150 different service applications. Five tables short-cut the usual engineering calculations and give right answer in matter of seconds. Bul 10100 — T. B. Wood's Son's Company, Chambersburg, Pa.

Check 5857 opposite last page.

Pulp press advantages

Engineering drawings and installation photos of manufacturer's multi-stage pulp press which fiberizes while it removes dissolved solids at high concentrations are contained in four-page bulletin. Bul 190 — Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Pennsylvania.

Check 5858 opposite last page.

Manganese chemicals

Catalog of 12 pages presents specs and price list for manganese salts, compounds. Chemicals — Manganese Chemicals Corp., Rand Tower, Minneapolis 2, Minn.

Check 5859 opposite last page.

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instantly with

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Check 5861 opposite last page

CHEMICAL PROCESSING

NEW LITERATURE

Adaptable scale

According to manufacturer's catalog, no matter where or how the load falls, the platform scale will deliver a true measurement of weight. Scale is reported adaptable to such automatic functions as remote indicating, recording, batching, and proportioning. Cat 12 — Weighing and Control Components, Inc., 206-A Lincoln Ave., Hatboro, Pa.

Check 5646 opposite last page.

Grips as it ships

Folder of four pages details advantages of corrugated interior packing material. Coating of pressure-sensitive adhesive on tips of exposed corrugations anchors product firmly in place. Anchor Pak Folder — Hinde & Dauch, Division of West Virginia Pulp & Paper Co., Sandusky, Ohio.

Check 5862 opposite last page.

Battery case histories

Several illustrated case histories showing how battery-powered equipment was used to overcome processing problems are contained in 16-page issue of storage battery magazine. "Storage Battery Power", Vol. 27, No. 3 — Edison Storage Battery Div., Thomas A. Edison Industries, West Orange, N. J.

Check 5863 opposite last page.

Thin-film processing

Colorfully illustrated 24-page catalog describes continuous thin-film processing unit and explains how it can simplify difficult processing problems. Using a turbulent thin-film technique, unit can process heat sensitives and other materials in a single pass with only minimum hold up. Full-color cutaway shows how unit works. Cat 117 — Process Equipment Div., The Rodney Hunt Machine Company, 117 Vale St., Orange, Mass.

Check 5864 opposite last page.

News and Notes on...

Good Packing Practice

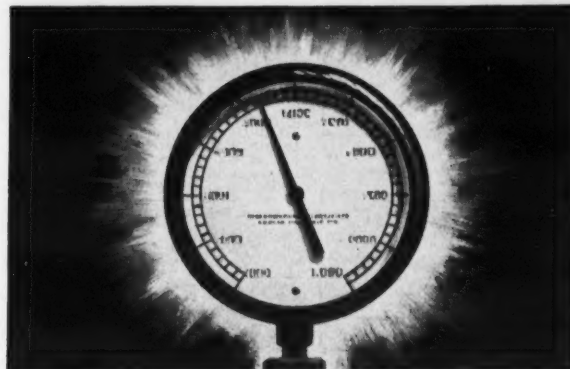


Maintenance and Design Hints from Johns-Manville Packings and Textiles Dept.

Subject of the month: High Operating Pressures

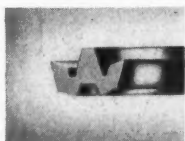
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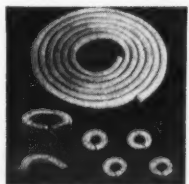
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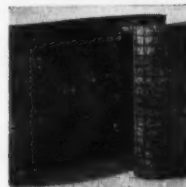


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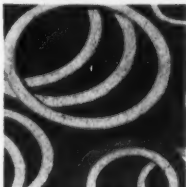
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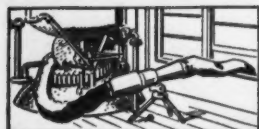
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Ventilate CONFINED Places with Vano Design "C" Ventilator-Exhauster



WELDING FUMES are here removed by this Vano Ventilator-Exhauster.



FUMES FROM A REACTOR KETTLE are here withdrawn by tripod-mounted Vano Ventilator-Exhauster. Note non-collapsible suction tubing and discharge tubing.

Ideal for withdrawing welding fumes from confined places or directly from the welding rod. Provides greater safety, greater comfort for workers... leads to greater work efficiency. Can be furnished with 8" suction inlet to which 8" non-collapsible suction tubing may be attached... or provided with multiple inlet nozzles for 5", 4" and 3" suction hose.

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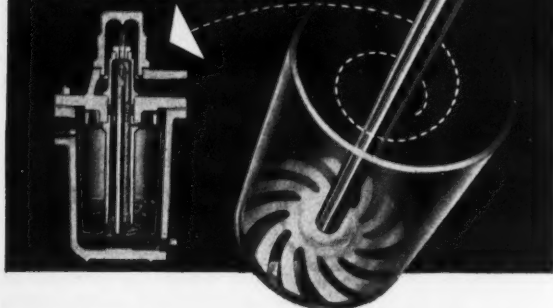
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Check 5867 opposite last page

NEW LITERATURE

Corrosion Inhibitor Info

Formulators of acid cleaners and others interested in the checking of corrosion will want to see manufacturer's booklet containing complete information on corrosion inhibitor. Bul on corrosion inhibitor — O'B-Hibit, PO Box 72, Caldwell, N.J.

Check 5680 opposite last page.

Walkie-stacker truck

Series of three four-page bulletins deal specifically with different-rated lifting capacity of manufacturer's electric hand lift truck. Buls 1005W, 1006W, and 1007W — Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill.

Check 5868 opposite last page.

Film on tape usage

Economies of proper tape usage and advantages of mechanically dispensed and applied pressure-sensitive tapes are described in 32-minute color movie. Film contains many on-the-job sequences shot in plants around the country which show taping and dispensing methods. "Two Billion Rolls" — Minnesota Mining and Mfg. Co., 900 Bush St., St. Paul 6, Minn.

Check 5869 opposite last page.

Signals flow rate

Fluid flow rate alarms for signalling or simple control functions are illustrated in four-page bulletin. Magnetic or electronic types for use with rotameters are discussed. Bul 165 — Brooks Rotameter Co., Lansdale, Pa.

Check 5870 opposite last page.

Moth eaten?

Hand book of 12 pages describes non-toxic durable mothproofing technique. Mitin — Geigy Dyestuffs, Div. of Geigy Chemical Corp., PO Box 430, Yonkers, N.Y.

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Over 60 years of service



Check 5872 opposite last page

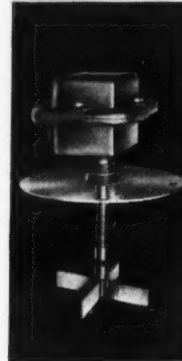
NEW BIN LEVEL INDICATOR

New ROTO-BIN-DICATOR®

Motor driven paddle-type
bin level indicator

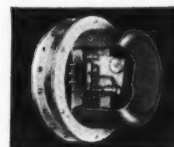
For automatic bin level indication or control of bulk materials. Particularly suited to applications on bins subject to pressure or vacuum.

EXPLOSION-PROOF
U. L. listed units available



BIN-DICATOR®

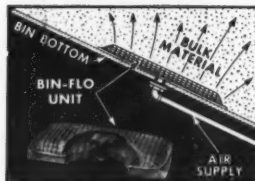
The original diaphragm-type bin level indicator. In successful use for 20 years.



BIN-FLO®

Assures gravity flow of
pulverized materials

Bin-Flo Aerator units in bins, chutes, etc., use small volume, low pressure air to restore flow to dry, pulverized materials which tend to pack and bridge in storage.



THE BIN-DICATOR CO.

13946-D Kercheval • Detroit 15, Mich.

Write for detailed Literature
or call

VALley 2-6952

WE SELL DIRECT • PHONE ORDERS COLLECT

Check 5873 opposite last page

CHEMICAL PROCESSING

NEW LITERATURE

Nuclear radiation effects

Findings on a group of chemicals, normally used as antioxidants, which inhibit radiation effects in natural rubber pure gum and black compounds are contained in 107 page Part 1 of two-part study. To obtain "A Study of the Effects of Nuclear Radiations of Elastomeric Compounds and Compounding Materials," Part 1, (PB 121811) remit \$2.75 direct to Office of Technical Services, US Dept. of Commerce, Washington 25, District of Columbia.

THF alcohol

Curiosity about tetrahydrofurfuryl alcohol can be rewarding in many different ways to those who investigate it, according to manufacturer who presents physical data, chemistry, uses, and general information about this interesting chemical in his Bul 206 — Chemicals Dept., The Quaker Oats Company, 336W The Merchandise Mart, Chicago 54, Illinois.

Check 5487 opposite last page.

Fork truck chart

Handy comparison chart enables potential purchasers of electric fork trucks to impartially evaluate various types and models. Operating, design, and maintenance characteristics of three different trucks can be surveyed by filling in appropriate categories. Comparison Chart — Dept. R-22, Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Massachusetts.

Check 5874 opposite last page.

Lists control devices

Manufacturer's complete line of general-purpose control devices is listed in 88-page illustrated catalog. Bul GEC-1260C — General Purpose Control Dept., General Electric Co., Schenectady 5, N.Y.

Check 5875 opposite last page.



Here is a close-up of a 2-inch-wide ring roller made of cast "H" Monel alloy. Eighty of these rollers feed the hide-splitting machines used at Seton Leather Company, Newark,

N. J. They are cast at the Inco foundry . . . where castings of any practical design or shape are turned out clean as a whistle. Free from distortion. Close as to tolerance.

Inco-cast ring rollers of "H" Monel help split the cost of splitting leather



Workers at Seton Leather Company, feeding freshly tanned hide to the cutting blade between two rows of rollers. The bottom ring rollers are made of cast "H" Monel for long life.

Hides are split to proper thicknesses while still wet from liming baths. And this can cause trouble in the hide-splitting machines.

When made of brass, the ring rollers that guide the skins wear out fast. Often in 18 months or less. They just can't take the hard wear . . . the corrosive tanning chemicals.

What's more, downtime and replacement costs are only a part of the expense. Worst of all is the damage done to the skins by defective brass rollers . . . damage that doesn't show up till later processing.

Faced with this problem, Seton Leather Goods Company — a manufacturer of patent leather — came to Inco. Inco Development and Re-

search men recommended "H"* Monel hard corrosion-resisting nickel-copper cast alloy. Seton tried it: *got rollers that last four to six years.*

When you have a problem involving castings of corrosion-resisting alloys, get in touch with Inco. Perhaps "H" Monel or one of the seven other specially developed Inco-casting alloys is the answer for you, too. Each provides a combination of properties to meet special service conditions.

For complete information, write for Inco's new booklet, "Cast to Outlast."

*Registered trademark

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.



Inco Castings . . . Sand, Centrifugal, Precision

Check 5876 opposite last page

NOW... 2 TORQUE Ranges

(to 900 Foot pounds)



both from one
STURTEVANT
TORQUE WRENCH

WIDE CHOICE OF
INTERCHANGEABLE
DRIVERS



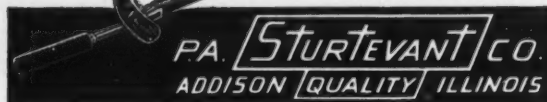
Now you can do high torque work with a Sturtevant Torque Wrench of normal capacity range—small in size—light in weight—with fine increment markings and moderately priced.

With a new Multi-range, Multi-purpose Adapter you can step up the capacity of your Torque Wrench to a new high range and you can plug in any drive end you want... Box wrench, ratchet, drive square for sockets. All drive and accessories are interchangeable and stock items.

In this way each Sturtevant Torque Wrench effectively equals two complete sets of ordinary single purpose Torque tools.

Only Torque wrenches with the Sturtevant patented patented handle can be compared with this.

write for No. SD-77 catalog sheet



Check 5877 opposite last page

DARCOVA PUMCUPS

now available with

100% NYLON COMPOSITION

for HYDRAULIC CONTROLS, AIR CYLINDERS, RECIPROCATING PUMPS

Darcova Pumcup

DARCOVA PUMCUPS—long noted for unequalled efficiency and life in all kinds of cylinders—are now greatly exceeding their own performance records! The new 100% Nylon Composition, available *only* in Darcova Pumcups, does it!

Nylon Pumcups are made in sizes, types and textures exactly right for your particular equipment—ready *now* to give you unprecedented piston packing performance!

Write for helpful data Bulletin No. 5503.



Darcova 45° Bevel Type Pumcup

DARLING VALVE & MANUFACTURING CO.
Williamsport 4, Pa.



TRADE MARK
PUMCUPS

Check 5878 opposite last page

NEW LITERATURE

Petrosolvents

Product folder of four pages on manufacturer's petrochemicals includes specification sheets on high-purity, nitration grade benzene and toluene, 5" xylene, high aromatic solvents, and mineral spirits. Petrochemicals Folder—Chemical Div., Delhi-Taylor Oil Corporation, 415 Madison Ave., New York 17, N. Y.

Check 5879 opposite last page.

Front-end loader features

Catalog presents construction and operating features of 2500-lb-capacity front-end loader, along with complete specifications and uses. How equipment can cut costs in handling bulk material is explained. Cat on Model H-25 Payloader—The Frank G. Hough Co., subsidiary of International Harvester Company, Libertyville, Ill.

Check 5427 opposite last page.

Details filters, strainers

Specifications, performance characteristics, and application data on manufacturer's line of filters and strainers for fluids and gases are presented in illustrated catalog. Helpful diagrams and charts are included. Cat 58-100, The Cuno Engineering Corp., S. Vine St., Meriden, Conn.

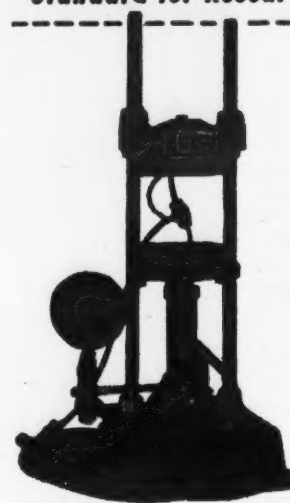
Check 5880 opposite last page.

Wooden pallet care

Beginning with an explanation on how to get the most out of wooden pallets in industrial operations, 16-page pamphlet sets up nine rules for proper pallet care. Containing 21 illustrations, pamphlet also covers maintenance and preventive maintenance. "Care for Wooden Pallets Can Control Maintenance Costs To You"—The National Wooden Pallet Manufacturers Association, 609 Barr Bldg., Washington 6, D. C.

Check 5881 opposite last page.

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CARVER
LABORATORY
PRESS



... wherever Pressing is required.

Accurately controlled pressures to 20,000 lbs., 6-inch gauge mounted on base. Carver Standard Accessories include Electric or Steam Hot Plates, Carver Test Cylinders, Swivel Bearing Plates, Cage Equipment. Available from stock. Write for catalog.

FRED S. CARVER INC.
HYDRAULIC EQUIPMENT

52 RIVER ROAD, SUMMIT, N.J.

Check 5882 opposite last page

IF YOU WANT COMPLETE SAFETY
IN YOUR SAFETY SWITCHES—

REMEMBER THE "V" FOR

VISIBLE BLADES!



Write for new Safety Switch Bulletin
Square D Company, 6060 Rivard Street
Detroit 11, Michigan



NOW... EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY

Check 5883 opposite last page

CHEMICAL PROCESSING

NEW LITERATURE

Air, gas dehydration

Well-illustrated 20-page bulletin contains valuable up-to-date technical data on characteristics of silica gel, air and gas dehydration, and numerous applications. Data presented are based on reliable laboratory and field tests. Bul 202 — Davison Chemical Company, Division of W. R. Grace & Co., Baltimore 3, Md.

Check 5482 opposite last page.

Steam-tight seat

Operation of steam trap with a rotating valve which assures stopping of leakage due to wire drawing is explained in bulletin that contains complete engineering data plus valve and orifice charts. Bul 1400D — H. O. Trerice Co., 1420-B West Lafayette Blvd., Detroit 16, Michigan.

Check 5867 opposite last page.

Polyethylene packaging

Well-illustrated 16-page booklet describes dozens of ways in which polyethylene is being used in packaging. "The Role of Polyethylene in Creative Packaging and Successful Selling" — Bakelite Company, Div. of Union Carbide Corporation, 260 Madison Ave., New York 16, N. Y.

Check 5885 opposite last page.

Food irradiation

State of development of the radiation process for preservation of food, and the activities of the joint Government committee coordinating the program, up to February 1957, are covered in 31-page report. The radiation process is described, and early research and development efforts are reviewed. To obtain "The Interdepartmental Radiation Preservation of Food Program: First Report by the Interdepartmental Committee", PB 131169, remit \$1.00 direct to the Office of Technical Services, US Dept. of Commerce, Washington 25, D. C.



"My alloy piping problems are simplified when both

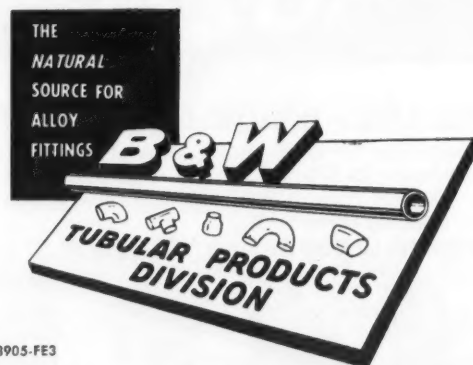
B&W Welding Fittings and Pipe

are used!"

"I'm in charge of scheduling, and coordinate buying and delivery with our fabricating needs. I find that when the specs call for an alloy system, I can depend on B&W to meet our requirements for welding fittings, flanges and pipe. I get matched piping and fittings with one call and one order — all from one responsible source."

B&W Welding Fittings, Flanges and Pipe are manufactured in the intermediate chromium-molybdenum alloys and stainless steels (B&W CROLOYS) in a wide range of sizes. They are available through B&W District Sales Offices and any qualified distributor. Write for Bulletin FB503.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION • FITTINGS DEPARTMENT
3839 WEST BURNHAM STREET • MILWAUKEE 46, WISCONSIN



FA-8905-FE3

Seamless welding fittings and forged steel flanges, seamless and welded tubular products, solid extrusions — in carbon, alloy, stainless steels and special metals.



Check 5886 opposite last page

NOW AT LAST! for Orig. Eqpt. Mfrs.

A low-cost chemical-resistant plastic pump that features:

- No stuffing boxes
- No shaft seals
- No valves or gaskets
- Self-priming
- Non-contaminating
- Non-agitating
- Operates wet or dry

Designed to give complete protection against leakage, corrosion, and maintenance problems.

Available close-coupled (shown here), foot-mounted, face-mounted, or special on request.

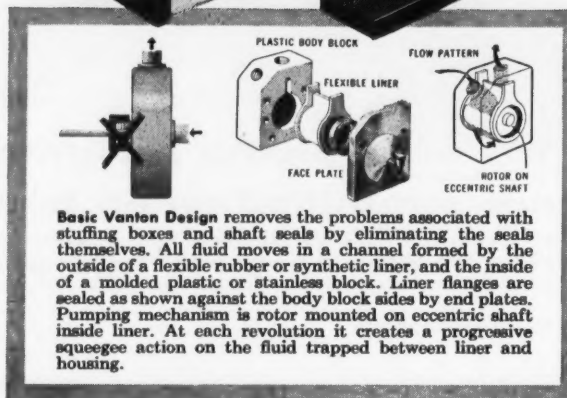
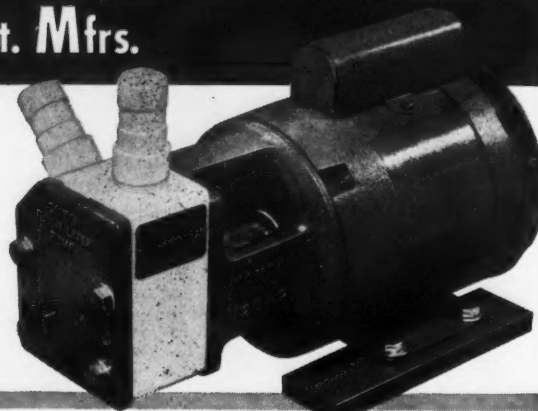
This new Vanton pump is designed to provide the equipment manufacturer with a low-cost, versatile, simple yet carefully engineered unit, problem-free with minimum maintenance. Construction materials at present available include PVC, high-temperature polyethylene, Teflon*, Buna N, bakelite, or stainless steel, in capacities from 1/3-10GPM. For information, write for BULLETIN CC10.1.

*Reg. trade mark of E. I. DuPont & Co.



VANTON PUMP
and Equipment Corp. • Hillside, N. J.
DIVISION OF COOPER ALLOY CORP.

Check 5887 opposite last page



NEW LITERATURE

Tractor maintenance

Written in narrative form, 30-page booklet explains how one tractor owner improved machine performance and longevity through good maintenance practices. Cartoons plus 106 full-color illustrations of useful service tips are included. This guide is intended to supplement more detailed information found in maintenance manual. Maintenance Guide, Traxcavators 933, 955, 977 — Caterpillar Tractor Company, Peoria, Ill. Check 5890 opposite last page.

Fume scrubber uses

Fume scrubbers used in chemical, metal treatment, electroplating, refining, and acid pickling plants are illustrated and described in four-page Bul B-71 — Heil Process Equipment Corp., 12901 Elmwood Ave., Cleveland 11, O. Check 5891 opposite last page.

Cut liquid entrainment

Manufacturer's entrainment separators are described in bulletin that includes engineering recommendations and complete data. Bul ME-6 — Metal Textile Corp., Roselle, New Jersey. Check 5545 opposite last page.

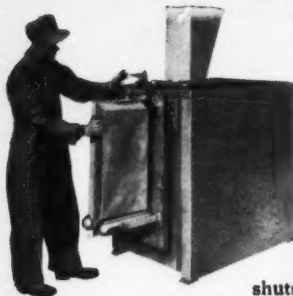
Industrial exhauster

Features and specifications of rugged exhaust fan for air or material handling requirements are covered in manufacturer's Bul 3576-B — Buffalo Forge Company, Buffalo, New York. Check 5571 opposite last page.

Stops air pollution

Facts and figures on typical installations for air pollution control and waste heat recovery are detailed in company brochure on Oxy-Catalyst Systems — Oxy-Catalyst, Inc., Wayne 7, Pa. Check 5814 opposite last page.

NEW... AIRPAC METHOD Cuts Bagging Costs!



CODDINGTON

AIRPAC Bag Packer

FILLS AND WEIGHS

Revolutionary new compressed air method—no moving parts—packs powdery materials in valve bags... shuts off automatically when desired weight is reached.

Small spout on economical AIRPAC fits popular size valve in bags... keeps bags clean... eliminates costly tying or bag closing equipment.

-----FILL OUT AND MAIL TODAY.-----

E. D. CODDINGTON MFG. CO.
5036 N. 37th Street, Milwaukee 9, Wisconsin

Please send me facts on the new AIRPAC Valve Bag Packer.

MY NAME.....

COMPANY.....

ADDRESS.....

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Check 5888 opposite last page



FULL CONE—HOLLOW CONE—FLAT SPRAY

Spraco has the most complete line of nozzles available anywhere — **IN STOCK**. Capacities range from 1/8 pint /min. to 4000 gal./min. Bronze, cast iron, and stainless steel. Write for our nozzle catalog.

SPRAY ENGINEERING CO., 105 Cambridge St., Burlington, Mass.



Check 5889 opposite last page

NEW LITERATURE

Economical cooling

How aftercooler systems have proved successful in large power and process installations and in air and gas liquefaction is discussed in bulletin. Self-contained system is independent of any large cooling water supply. Bul 130 — Niagara Blower Company, Dept. CP-6, 405 Lexington Ave., New York 17, N. Y.

Check 5569 opposite last page.

Silicone oil specs

Data sheet of four pages describes specifications and physical properties of electrical grade silicone oil. Data Sheet SF-1103 — Silicones Div., Union Carbide Corp., 30 E. 42nd St., New York 17, New York.

Check 5892 opposite last page.

Fastenings catalog

Complete listing of all sizes of non-ferrous and stainless steel bolts, nuts, screws, rivets, and washers in manufacturer's line is contained in 84-page catalog. Net Price Cat — The H. M. Harper Company, 8299 Lehigh Ave., Morton Grove, Ill.

Check 5893 opposite last page.

Detailed valve info

Incorporating detailed cross-section illustrations, 56-page catalog provides comprehensive data to aid in selection and application of valves for water, oil, and air. Cat 58-59 — Barksdale Valves, 5125 Alcoa Ave., Los Angeles 58, Calif.

Check 5894 opposite last page.

Refined anthracene

Properties, solubility, reactions, and toxicity of refined anthracene are covered in four-page Bul TDR-C574 — Barrett Div., Allied Chemical Corporation, 40 Rector St., New York 6, N.Y.

Check 5895 opposite last page.

**You can do your
Drying-Grinding-Separating
all in ONE Machine**

WITH THE RAYMOND Flash Drying IMP MILL

SEPARATING
GRINDING
DRYING



This versatile Imp Mill is a compact unit that does a complete job in minimum space. It provides a clean, dustless, automatic system for a wide range of applications, of which the following are typical:

In the production of certain synthetic resins, the Imp Mill with Flash Drying accessories is used for simultaneously drying and grinding the materials to a fine, dry, uniform product.

Processing chalk for fillers used in paint and rubber manufacture . . . drying the raw material from 10% down to 2% final moisture while grinding the product to a fineness of 99% passing 100-mesh.

Calcining gypsum for making wallboard . . . handling raw gypsum containing 25% surface and combined moisture, and delivering the finished product with less than 5% moisture content.

*For further details and uses of the
Raymond Imp Mill with Flash Drying
Accessories, write for Catalog No. 77.*

**RAYMOND IMP MILL equipped
with Flash Drying Accessories,
including the new package
type furnace.**

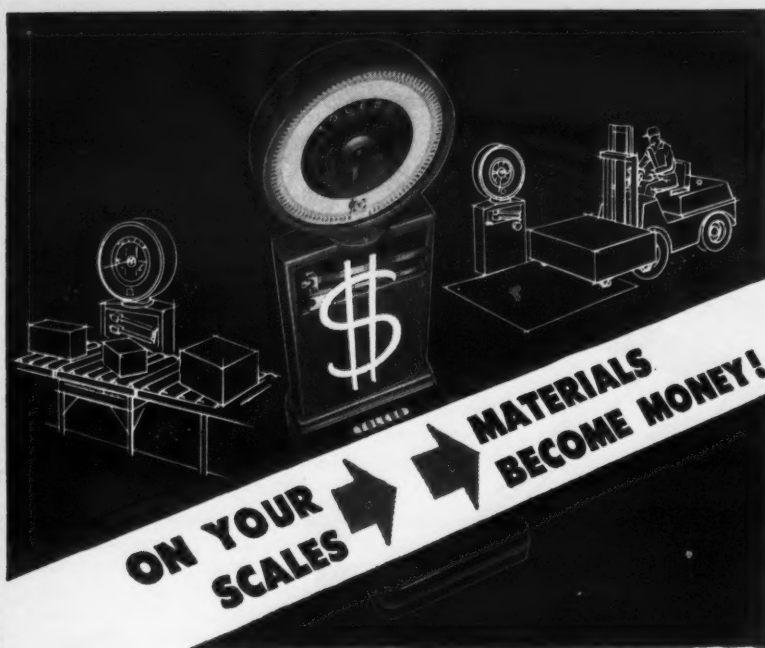
COMBUSTION ENGINEERING, INC.
Raymond Division

1317 North Branch St.
Chicago 22, Illinois

Sales Offices in
Principal Cities

COMBUSTION ENGINEERING-SUPERHEATER LTD., Montreal, Canada

Check 5896 opposite last page



It will pay you to check now on weighing efficiency in your plant!

Efficient weighing is a prime requirement for proper cost control. Weight records directly affect costs, quality, inventory control and customer billing. You can avoid weighing errors and inadequate weight data by placing the right scales in the right places . . . all properly integrated in a *plant-wide weighing system* to supply basic accounting records on materials received, transferred and shipped.

You can easily check up on the job your scales are now doing. Just ask for the exclusive Toledo Weight Fact Kit. A Toledoman will gladly explain how it will help you detect and correct weighing inefficiencies in your plant. **REQUEST YOUR WEIGHT FACTKITNOW.** No obligation. Address Toledo Scale, 1423 Telegraph Rd., Toledo 12, Ohio.



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DIVISION OF TOLEDO SCALE CORPORATION

Headquarters for
Weighing Systems



MOTOR
TRUCK
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PORTABLE
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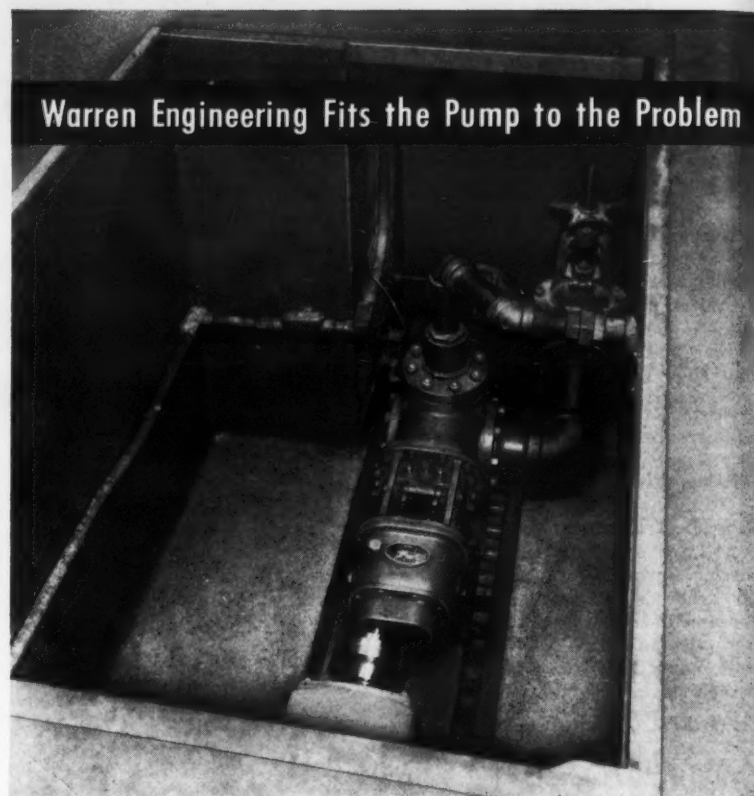


HOPPER
SCALE



REMOTE
DIGITAL
WEIGHT
RECORDING

Check 5897 opposite last page



Warren Engineering Fits the Pump to the Problem

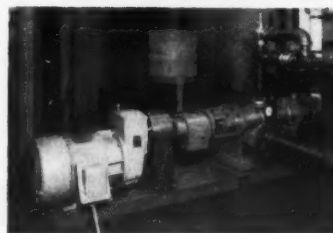
Abrasive quality of insulating paint was death on pumps . . . until Warren engineers suggested this *special Warren Screw Pump*.

What type of pump will best handle an extremely abrasive and viscous material?

After wearing out one pump in a few *hours*, another in a few weeks . . . a large manufacturer of electrical equipment sought the help of Warren engineers. The solution was the Warren #3½ External Gear and Bearing Screw Pump pictured above.

It wasn't delivered "off the shelf," though. Warren engineers suggested several special experience-proven features to prolong the life of the pump against the abrasiveness of the widely-used and highly efficient insulating paint. And it was designed to handle 40 GPM at 60 PSI discharge pressure at 32,000 SSU viscosity at 420 RPM.

Although the pump was installed deep in a pit, over a year ago, maintenance has been no problem — because there has been no need for it. A thorough inspection after 1900 hours' operation showed no wear. Warren engineers have again fitted the pump to the problem.



Here is another Warren #3½ External Gear and Bearing Screw Pump recently installed in the same plant.

For detailed information on Warren External Gear and Bearing Screw Pumps, write for Bulletin S-206.



WARREN PUMPS, INC.

WARREN, MASSACHUSETTS

C-9

Check 5898 opposite last page

CHEMICAL PROCESSING

A Message to Executives
Seeking a New Plant Site



Check these 3 Important
Plant Location Advantages in

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100% financing for your new plant

Complete financing on lease-purchase plan—low interest rate—deferred amortization. Plant "shells" now being readied for completion. Inspection welcomed.

Improved "tax climate"

No capital stock and franchise taxes—no machinery and equipment taxes—no stock transfer tax—no state personal income tax—reduced manufacturer's sales tax.

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Staff specialists available to serve industry, engineering firms, management consultants, industrial realtors and others with fully detailed plant location data.



For free copy of pamphlets on these Pennsylvania Plant Location Advantages, write or call:

PENNSYLVANIA DEPARTMENT OF COMMERCE
Main Capitol Building
1173 State Street, Harrisburg, Pa.
Phone: CEder 4-2912

NEW LITERATURE

Nuclear reactor wear

Volume of 239 pages, illustrated with 152 drawings and photographs, gives solutions of engineering problems resulting from use of water as a nuclear reactor coolant. Handbook presents, in one reference source, corrosion and wear data resulting from the development of the Nautilus submarine and Shippingport reactors. To obtain "Corrosion and Wear Handbook For Water Cooled Reactors", remit \$2.25 direct to Superintendent of Documents, US Government Printing Office, Washington 25, D. C.

What makes truck tick?

Behind-the-scenes account presents close analysis of individual components that go into finished fork lift truck. Many features of manufacturer's truck are outlined in easy-to-understand, well-illustrated booklet "What Makes Towmotor Tick" — Towmotor Corporation, 1226 East 152nd St., Cleveland 10, Ohio.

Check 5900 opposite last page.

Details homogenizer

Bulletin of four pages illustrates, describes, and presents specifications of unit that uses impact, attrition, turbulence, and ultrasonic cavitation to produce complete and fast homogenizations at low cost. Homogenizer bul — Buschman Products, Inc., 369 Lexington Ave., New York 17, New York.

Check 5901 opposite last page.

Temp control problem?

Folder of four pages describes how temperature control unit can help equipment to run at faster speeds, require less maintenance, have longer life, and reduced assembly costs. Bul MC-157 — Fenwal Inc., Ashland, Mass.

Check 5902 opposite last page.

When TUBE MAINTENANCE is the problem . . . AIRETOOL has the answer

Air-powered tools for solving the toughest tube maintenance problems efficiently and economically.



FASTER TUBE ROLLING with the new Airetrol Tube Expansion Control. Just set dial and torque sensing cam automatically stops expansion to .001" accuracy. Air-motor equipment and expansion tools for tubes 1/4" to 1 1/2". Electrically operated expansion control system for larger tubes.

EFFECTIVE CONDENSER TUBE CLEANER Speedy, lightweight tool for cleaning hardest scale from tubes up to 1". Built-in flushing system removes chips . . . keeps drill cool.

CUT TUBES QUICK AND EASY Cuts steel or non-ferrous tubes through tube sheets up to 4" thick. Positive feed control . . . no gouging or burning. Air or electric motor.

POWERFUL TUBE CLEANERS A complete line of cleaners and brush heads for straight or curved tube maintenance.

Write for literature on any Airetool equipment or contact your Airetool representative for assistance on tube cleaning problems.

REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, South America, England, Puerto Rico, Italy, Japan, Hawaii.
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario



INTERNAL TUBE CUTTER

AIRETOOL

MANUFACTURING COMPANY

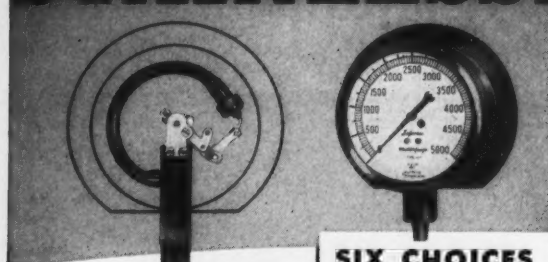
SPRINGFIELD, OHIO

BRANCH OFFICES:
New York, Chicago,
Tulsa, Philadelphia,
Houston, Baton Rouge.

Check 5903 opposite last page

Check 5899 opposite last page

STAINLESS!



—from inlet to tip

Now the superlative Master-gauge is available in a wider range of corrosion resistant tubes and sockets than any other pressure gauge.

Check the adjoining list. And remember that tube socket and tip are fused into one piece by the exclusive Marsh "Conoweld" process.

Marsh alone combines the "Conoweld" construction, the copper-clad "Marshallloy" case, the finer Mastergauge movement, the Marsh "Recalibrator", the new "Safecase." Ask for data covering your specific needs.

SIX CHOICES of tubes and sockets

4130 alloy steel tube with alloy steel tip and socket.

403 stainless steel tube with alloy steel tip and socket.

403 stainless steel tube with 416 stainless tip and socket.

316 stainless steel tube with alloy steel tip and socket.

316 stainless steel tube with 303 stainless tip and socket.

"K" Monel tube with alloy steel tip and socket.

MARSH INSTRUMENT CO., Sales affiliate of Jas. P. Marsh Corp. Dept. Z, Skokie, Ill.
Marsh Instrument & Valve Co., (Can.) Ltd. • 8407 103rd St., Edmonton, Alberta, Can.

MARSH



Check 5904 opposite last page

The 42 LB.

GRIPHOIST

TIE FOR

LIFTS • PULLS

LOWERS

3300 LBS.

Single Line

6 TONS

OR MORE

with pulley blocks

Unlimited cable travel
... Portable ... Hand
Operated

Standard equipment
with refineries, engi-
neering contractors,
mines, pile drivers, rail-
ways, electricians, tele-
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sawmills, all rigging.

One Year Written Guarantee

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Princeton Griphoist, Inc.
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Griphoist, Inc.
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San Francisco 7, Calif.

Check 5905 opposite last page

NEW LITERATURE

Levullnic acid reactions . . .

. . . and other data on this interesting chemical with polyfunctional characteristics are described in company bulletin which tells, for example, how the chemical acts both as a carboxylic acid and as a ketone. Bul 301 — Chemicals Dept., The Quaker Oats Company, 336X, The Merchandise Mart, Chicago 54, Ill.

Check 5508 opposite last page.

Valve comparison chart

Manufacturer has provided 24-page comparison chart to help eliminate change-over problems by furnishing descriptions of valves for many different service conditions. All comparisons listed in this chart are derived from latest available valve manufacturer's catalogs. Valve comparison chart — The Ohio Injector Company, Wadsworth, Ohio.

Check 5906 opposite last page.

Asbestos sheet packing, gaskets

Company's homogeneous compressed asbestos sheet packing and gaskets are described in illustrated eight-page bulletin. Included is list of 120 chemicals that can be handled safely by gaskets cut from this single-formula material. Form 500 — Durabla Manufacturing Co., 114 Liberty St., New York 6, N. Y.

Check 5907 opposite last page.

Air pollution legislation

The second edition of a booklet originally issued in 1952, defines precepts and principles essential to air pollution legislation and also outlines step-by-step procedures for formulating such laws. Sections on rule-making and enforcement are included in 20-page booklet. "A Rational Approach to Air Pollution Legislation" — Manufacturing Chemists' Association, Inc., 1625 Eye St., N.W. Washington 6, D. C.

Check 5908 opposite last page.

NEW NO. 460 AIR METER

BY **Dwyer**

NOW

AN ALL-PURPOSE LOW-COST INSTRUMENT FOR STATIC PRESSURE AND AIR VELOCITY MEASUREMENTS

High and low ranges give direct velocity readings from 260 to 4000 fpm., static pressure readings from .005 to 1.0 inches of water. A complete instrument kit with every accessory needed for adjusting and balancing air conditioning, heating and ventilating equipment. The entire kit will fit in your shirt pocket.

WRITE FOR BULLETIN B-9

F. W. DWYER MFG. CO.

P. O. BOX 373-CP MICHIGAN CITY, INDIANA

Check 5909 opposite last page

SUPPLY GRILLE VELOCITY

RETURN GRILLE VELOCITY

OVER-FIRE AND SMOKE PIPE DRAFT

STATIC PRESSURE

The 42 LB.

GRIPHOIST

TIE FOR

LIFTS • PULLS

LOWERS

3300 LBS.

Single Line

6 TONS

OR MORE

with pulley blocks

Unlimited cable travel
... Portable ... Hand
Operated

Standard equipment
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steel erectors, plumbers,
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One Year Written Guarantee

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4 Vital Advantages

Here is the "inside story" on why the Rotary Union gives better and longer service.

- 1—Heavy Monel Bellows automatically adjusts to pressure. Keeps sealing surfaces parallel and leakproof at all times. A completely mechanical seal.
- 2—Seal Ring—optically flat surface assures perfect seal.
- 3—Ball Bearing Construction. Precision, heavy-duty, radial thrust type. Minimizes friction and power consumption.
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The Rotary Union needs no mechanical maintenance or adjustments . . . a positive mechanical seal . . . minimizes downtime, labor, and replacements. Pipe Sizes 1/4" through 3". For full information contact our nearest office or write for Bulletin 700C.

*Trade Name—Patented

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Baltimore — Buffalo — Camden, N. J. — Chicago — Cleveland — Los Angeles
New York — Providence — Hamilton, Ont. — Montreal — Toronto

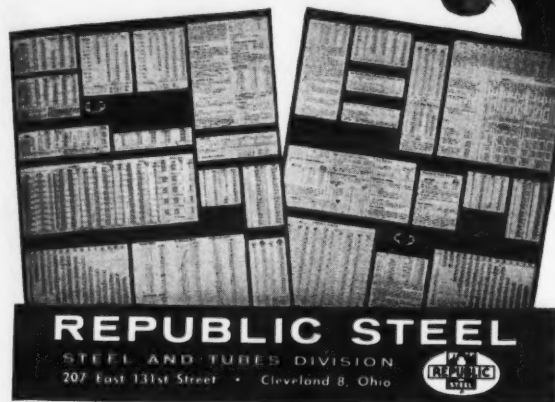
Check 5910 opposite last page

CHEMICAL PROCESSING

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Check 5911 opposite last page

"NOSEY" says:



IN their business of controlling bad odors, FRITZSCHE has made many interesting friends. Through their ALDAROMES®, they have become the embalmer's friend; PuTROL® has made them solid with fat renderers and the like; and, of course, NEUTROLEUM®, the bane of all bad odors, is their top good will ambassador. You'll find FRITZSCHE good folks to know if ever you're bothered with a hard-to-handle odor problem — that's for sure!

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Brothers, Inc.

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BRANCH OFFICES and *STOCKS: Atlanta, Ga., Boston, Mass., *Chicago, Ill., Cincinnati, O., *Los Angeles, Calif., Philadelphia, Pa., San Francisco, Calif., St. Louis, Mo., Montreal and *Toronto, Canada and *Mexico, D. F. FACTORY: Clifton, N. J.

Check 5912 opposite last page

NEW LITERATURE

Small vent system

Bulletin details versatile belted vent sets which are especially adaptable to smaller system requirements where low initial and operating costs are important, and where a quiet fan is necessary. Bul 3720-A — Buffalo Forge Company, Buffalo, New York.

Check 5571 opposite last page.

Electrical controllers

Detailed information on all types of manufacturer's automatic electrical control equipment is presented in 64-page catalog on switches, controls, and timing devices. Applications, construction details, engineering data, and operating features are included. Cat 18 — Zenith Electric Co., Dept. CPC, 152 W. Walton St., Chicago 10, Ill.

Check 5913 opposite last page.

Packless valves

Four-page engineering bulletin gives detailed drawings and descriptive information on packless valves used for liquid metal service and other applications at high temperatures. Bul issued by Hoke, Inc., Cresskill, N. J.

Check 5914 opposite last page.

Belt conveyor bulletin

Design, specifications, and operating details covering manufacturer's sliding-type belt conveyors are contained in data sheet. Bul BCB-101 — Carpc Co Mfg., Inc., PO Box 3272, Jacksonville 6, Florida.

Check 5915 opposite last page.

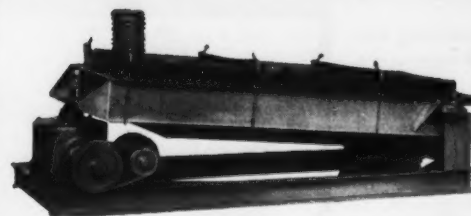
Nozzle catalog

Capacities and other pertinent data on bronze, cast iron, and stainless steel nozzles are contained in Nozzle Catalog — Spray Engineering Co., 105 Cambridge St., Burlington, Massachusetts.

Check 5889 opposite last page.

ROTEX®

SCREENERS GIVE



PROFITABLE PRODUCTION!

ROTEX FEATURES

- Low head room
- No screen blinding
- Fast screen changes
- Dependable service
- Dust-tite construction
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For over 40 years ROTEX Screeners have been widely used throughout industry. Today there are installations in the United States and over 25 foreign countries. Built for dependable service, ROTEX are long known for accuracy, capacity and operating economy.

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The nearly level, gyratory motion, pioneered in ROTEX, conveys materials rapidly over screen surfaces with minimum vertical vibration or hop. This stratifies the material by particle size, rapidly passing undersize particles through the mesh openings. The results are clean separations of exacting accuracy coupled with high capacity. Designed for operating convenience, ROTEX Screeners pay for themselves by the economies they effect.

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To meet your requirements: 25 standard models—one to five screen surfaces—many semi-standard and special models—sanitary and all-metal construction available.

Write for Bulletin 401 and information on your screening requirements. Our engineering staff will be pleased to cooperate with you.

MECHANICAL FEATURES

All Metal Screen Box
Self-Aligning Slide Bearings
Quiet Running Counter-Balanced Drive
Heavy Welded Structural Steel Base

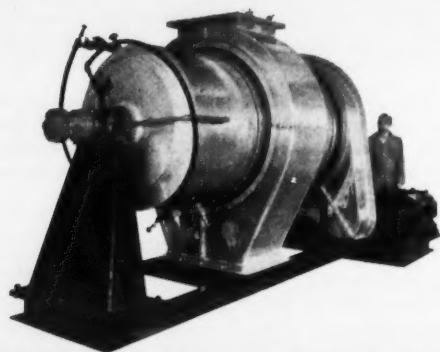
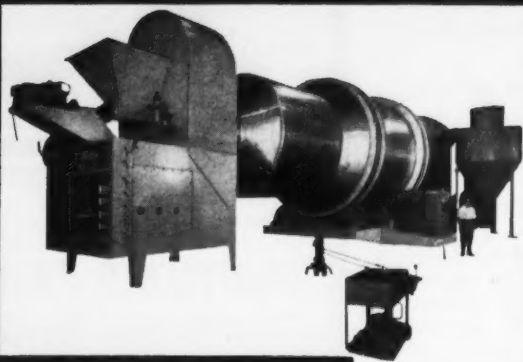
ROTEX

The Orville Simpson Co.
1246 Knowlton St., Cincinnati 23, Ohio

Check 5916 opposite last page

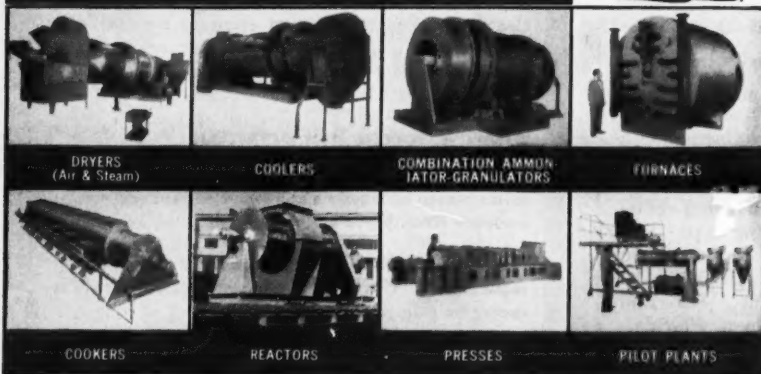
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Renneburg low temperature, variable inclination, rubber-tired, steam-heated DehydrO-Mat Dryer for ammonium nitrates and other hard-to-dry chemicals requiring long hold-up times.



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Literature and information on request

Edw. Renneburg & Sons Co.

2839 BOSTON STREET, BALTIMORE 24, MD.

Check 5917 opposite last page

NEW LITERATURE

Vibration & heat transfer

Bulletin of 28 pages describes various types of vibrating heat transfer equipment. In addition to conveyors, it illustrates coolers, dryers, and heaters with specific application details in heat transfer data. Tech Information Bul 4 — Carrier Conveyor Corp., 530 River Rd., Louisville 2, Kentucky.

Check 5918 opposite last page.

Hot water generation

Spec sheet of six pages presents information on line of package generators designed specifically for forced circulation, hot water systems. Outputs range from 670,000 to 6,700,000 Btu. "Package Boiler Economy for Modern Hot Water Systems" — Cyclotherm Div., National-U.S. Radiator Corporation, Oswego, New York.

Check 5919 opposite last page.

Pressurized packaging

Bulletin of eight pages on application of nitrous oxide in pressurized packaging of food and non-food products supplies data on chemical, pharmacological, and physical properties of nitrous oxide. Form GP-1 — Ohio Chemical & Surgical Equipment Co., a Div. of Air Reduction Co., Inc., 1400 E. Washington Ave., Madison 10, Wis.

Check 5920 opposite last page.

Methane study

Report of 12 pages deals with the development of an expression for measuring thermal decomposition of methane. Mechanism is based on an examination of literature on the homogeneous pyrolysis of methane. To obtain "A Study of the Thermal Decomposition of Methane", PB 121450, remit 50c direct to Office of Technical Services, US Dept. of Commerce, Washington 25, District of Columbia.

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ILLCO Nuclear Grade Resins are specially treated to remove the organic matter and inorganic materials which are found in ordinary ion-exchange resins, after which treatment they are super-regenerated on any selected cycle. Nuclear Grade Resins are suitable for research and process applications where higher-than-ordinary purity of the resin is required. Nine standardized types are available, and special types can be produced on request.

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ILLCO Nuclear Grade Resins are used to purify water used for heat transfer and shielding at the great new pioneering atomic energy power plant at Shippingport, Pa., a joint project of the Atomic Energy Commission and Duquesne Light Company of Pittsburgh.

WRITE FOR THIS DATA SHEET

Gives information on all types of Technical and Nuclear Grade Resins, together with clear illustrations of important ILLCO color indicator.



ILLCO-WAY

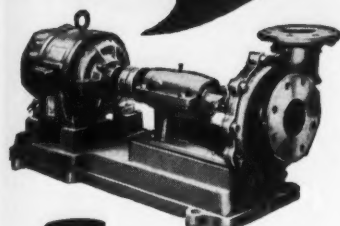
ILLINOIS WATER
TREATMENT CO.
840 Cedar St.
Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.

Check 5921 opposite last page

CHEMICAL PROCESSING

Custom-built for
**EFFICIENT
DEPENDABLE
SERVICE**



**Frederick
SSV PUMPS**

**Enclosed Impeller
and Open Impeller Types**

You're sure of maximum service and output with minimum maintenance or production down time with Frederick SSV Centrifugal Pumps because each pump is custom-made to fit your particular operation—whatever the consistency or type of liquid you're moving.

SSV PUMP FEATURES

- Pump sizes from 1" to 4" discharge openings.
- Pump capacities from 50 up to 700 U.S. GPM.
- Heads from 30 up to 220 feet.
- Pumps speeds can be varied to suit the driving media and operating conditions.

CONSTRUCTION ADVANTAGES

Pump casings are vertically split for easy accessibility. Mounted on a swivel to permit placing discharge in any desirable position. Pump openings, both suction and discharge, flanged to permit easier connection and disconnecting to joints. One-piece impellers, securely attached to shaft by stout key and lock nut, or threaded, give long service. Pump bearings mounted in sturdy frame horizontally split for easier accessibility. Extra long stuffing box provides for oversize stuffing. Mechanical seal also available for minimum leakage. Pump coupling flexible for direct connection to drivers or can be arranged for belt drive. Pump speed, pump openings, etc. are selected to suit your particular requirements.

Write for Bulletin No. 107



FREDERICK IRON AND STEEL, INC.
FREDERICK, ESTD 1890, MARYLAND

Check 5922 opposite last page

NEW LITERATURE

Tramp Iron protection

Booklet describes ceramic permanent-magnet pulley reported to outperform conventional permanent-magnet pulleys in protection against tramp iron. Bul 1021-P — Stearns Magnetic Products, division of The Indiana Steel Products Co., 635 South 28th St., Milwaukee 46, Wis.

Check 5724 opposite last page.

A new switch

"How Others Do It" publication of four pages contains ideas submitted by plant engineers, electricians, and maintenance men to increase production efficiency using manufacturer's miniature switches. "Micro Tips" Vol 1, No. 24 — Micro Switch, Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill.

Check 5923 opposite last page.

Conveyor pulleys

Catalog of 12 pages describes manufacturer's heavy-duty conveyor pulleys and provides complete listing of dimensions. Cat CP-57 — The American Pulley Company, 4200 Wissahickon Ave., Philadelphia 29, Pennsylvania.

Check 5924 opposite last page.

Provides flow control

Bulletin of four pages describes precision-type stopcock for flow control of liquids and gases over broad range of flow rates. Bul 101 — Wilmad Glass Company, Franklin & Flower Sts., Landisville, N. J.

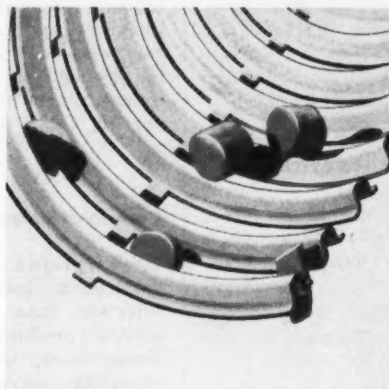
Check 5925 opposite last page.

Polyether flexible foam

Bulletin of six pages tells formulation, preparation, and curing of polyether flexible foams. Bul 11058 — National Aniline Div., Allied Chemical Corporation, 40 Rector St., New York 6, N.Y.

Check 5926 opposite last page.

**Lately more plastics materials
are being sized and separated
by Hart-Carter machines**

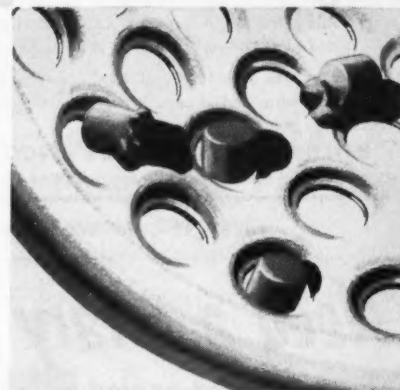


**CARTER GRADERS PERFORM
THICKNESS, WIDTH SEPARATIONS**

For sizing or separating free-flowing granular materials by *thickness*, Carter Precision Graders use revolving cylinders with *slotted perforations at the bottom of grooves*. Saddles between these grooves upedge the materials presenting them to the slots in an edgewise position. The thinner pieces pass through and the thicker pieces pass over

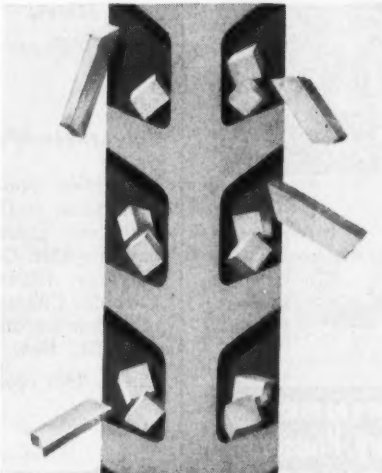
and are conveyed to the end of the machine.

For *width* sizing or separating the Precision Graders use revolving cylinders with *round recessed perforations*. The recess causes the materials to be presented to the round perforations in an upended position. Narrow pieces pass through and wider pieces pass over for discharge at the end of the cylinder.



**CARTER SEPARATORS ASSURE
POSITIVE LENGTH SEPARATION**

Carter Disc Separators contain a series of discs mounted on a revolving horizontal shaft. Each disc has hundreds of undercut pockets which select or reject plastics or similar materials according to *length*. As the discs revolve through a mixture of materials, the pockets lift out the shorter pieces. The longer pieces, too long to be held in the pockets as they rise, drop away from the discs.



Write today for complete information and descriptive folders on Hart-Carter machines.



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677 Nineteenth Ave. N.E.

Minneapolis 18, Minn.

Check 5927 opposite last page

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with **Leak Lock**



**the joint sealer
that prevents leaks
where others fail!**

Here's real leak prevention . . . an easy-to-use, economical joint sealer that holds reactive gases, oils, gasoline, petro-chemicals, chlorinated solvents and refrigerants which eat through ordinary joint sealers. And it remains flexible indefinitely . . . stretches rather than breaks . . . the dependable choice for stopping wasteful or hazardous leaks in the petroleum, chemical, atomic energy, electronic, refrigeration and other fields.

Approved by Underwriters' Laboratories for gas and oil equipment list, and for propane and butane.



FREE SAMPLE—"Leak Lock" is available in handy tubes and in cans. Write on your letterhead for sample tube.

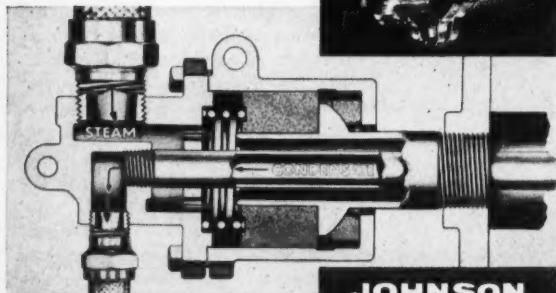
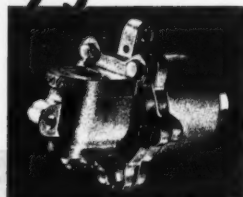
HIGHSIDE CHEMICALS INCORPORATED

16 Colfax Avenue • Clifton, N. J.

Check 5928 opposite last page

Need a rotary joint?

... for water-cooled
or steam-heated
rolls ...



**JOHNSON
Rotary Pressure
JOINTS**

Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.

Johnson started the whole idea . . . is far ahead in know-how, available types and sizes. Johnson Joints are completely packless, need no lubrication or adjustment. Used on dryer rolls, mills, waxers, calenders, slushers, printing presses, etc.—handling steam, water, hot heat transfer oils, Dowtherm, Monsanto Aroclors, etc. Actually serving under pressures as high as 2400 psi. Sizes up to 8".



THE JOHNSON CORPORATION
826 Wood St., Three Rivers, Michigan

Check 5929 opposite last page

NEW LITERATURE

Filter cartridge chart

Handy nine-page selector chart indicates type of filter cartridge, temperature limitations, and suggested filter housing materials for over 250 filtering applications. Filter cartridge selector chart may be obtained on letterhead request from The Cuno Engineering Corp., Meriden, Conn.

Conveyor chains

Descriptions, specifications, application information, and selection data on manufacturer's products for power transmission, conveying, and elevating service are contained in Cat 610 — Chain Belt Company, Milwaukee 1, Wisconsin.

Check 5930 opposite last page.

Pumps almost anything . . .

. . . says manufacturer of this vertical wet-pit pump described and illustrated in catalog that includes complete specifications. Vertical Wet-pit Pump Cat — Yeomans, 2003-5 N. Ruby St., Melrose Park, Illinois.

Check 5808 opposite last page.

Polyethylene glycols

Properties, applications, storage, specs, and testing of polyethylene glycols are in 54-page booklet. Carbowax Polyethylene Glycols — Union Carbide Chemicals Co., Div. of Union Carbide Corp., 30 E. 42nd St., New York 17, N.Y.

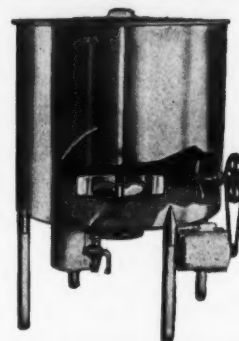
Check 5931 opposite last page.

Details on vacuum dryer

Illustrated folder presents details on manufacturer's vacuum dryer which can also be used as a cone blender. Vacuum Dryer Folder — Paul O. Abbé Inc., 402 Center Ave., Little Falls, N.J.

Check 5762 opposite last page.

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**Designed
for storage or
processing
to give you
maximum service**

All styles including vertical, horizontal, and rectangular . . . open & closed . . . IN STOCK or to your specifications.

*** QUALITY
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Check 5932 opposite last page

CUSTOM FABRICATING DATA—Request New Brochure M-56

This information on plant facilities and services will be of value to purchasing, procurement and engineering personnel when planning the custom fabrication of . . .



ACID PLANT VESSELS

**for the Chemical Processing
Industry on the West Coast**

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FABRICATORS, INC.**

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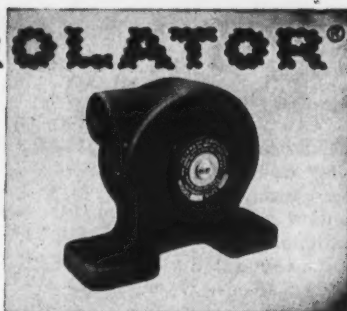
Craftsmen in steel plate and alloys up to 1"

Check 5933 opposite last page

CHEMICAL PROCESSING

VIBROLATOR®

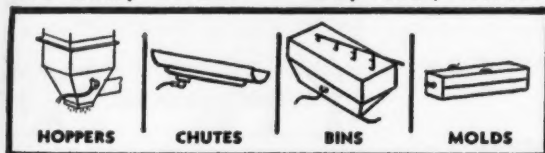
the strong
silent type
VIBRATOR



FOR MOVEMENT OF WET OR DRY MATERIAL

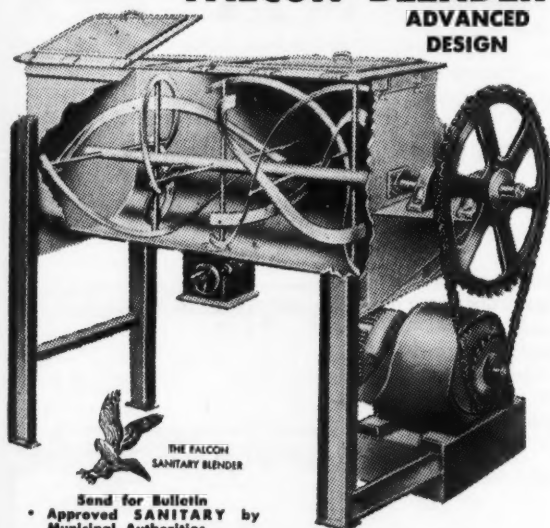
One moving part does the job — a rolling ball driven by compressed air. Needs no oil or filters. The VIBROLATOR moves materials down chutes, out of hoppers, actuates screens, brings up entrained air in wet plaster or concrete, available in 14 sizes, priced from \$12 to \$150, from "pocket-watch" size to the new 28 lb. UCV-64, ideal for vibrating RR hopper cars. Write for catalog today.

MARTIN ENGINEERING COMPANY
155 Kemp Street • Neponset, Illinois



Check 5934 opposite last page

The NEWEST **FALCON BLENDER** ADVANCED DESIGN



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Approved **SANITARY** by
Municipal Authorities
Unique Double Ribbon For
Faster efficient Mixing
All Sizes usually in Stock
in Stainless or Mild Steel
Requires Less Power per
load
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No projections to retain

- material
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Jackets Available for Heat-
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The **FALCON** is competitive-
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The **FALCON** MANUFACTURING
DIVISION OF

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211 TENTH ST., BROOKLYN 15, N.Y. ST. 8-4672

Check 5935 opposite last page

NEW LITERATURE

Revenue producer

Manufacturer's bulletins contain full details on heat exchanger equipment, including case histories on how equipment is quickly amortized and revenue realized. Buls 120 and 135 — Niagara Blower Co., Dept. CP-6, 405 Lexington Ave., New York 17, N. Y.

Check 5542 opposite last page.

Chem-resistant coating

Acid-solvent-alkali-resistant coatings for corrosion contamination resistance are detailed in eight-page technical bulletin. Description, properties, uses, and other data are listed. Tech Release TB 957-2 — Bisonite Co., Inc., Buffalo 17, N. Y.

Check 5936 opposite last page.

For pipe coil users

Both design and price information are presented in valuable four-page pipe coil bulletin which also tells how to do your own estimating. Bul 258 — Dean Thermo-Panel Coil Div., Dean Products, Inc., 616 Franklin Ave., Brooklyn 38, N. Y.

Check 5937 opposite last page.

Fork truck on job

Bulletin of four pages which lists specifications of manufacturer's fork lift truck contains on-the-job photos showing unit in action. "Majik-Loder" Bul — John Morrell Manufacturing Co., 525 Highland Ave., Elgin, Ill.

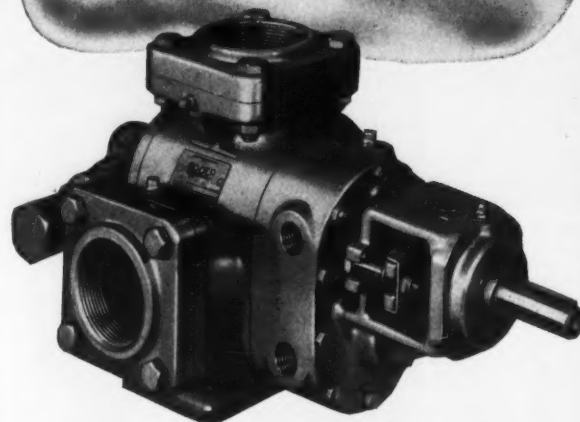
Check 5938 opposite last page.

Styrene moldings

Printed in brochure form, comparative properties chart discusses styrene molding compounds. "Styrene Formulations, Granulations" — Catalin Corporation of America, One Park Ave., New York 16, New York.

Check 5939 opposite last page.

NEW ROPER PUMP WITH STEAM CHEST



LOW COST METHOD OF HEAT TRANSFER TO PUMP AND PACKING

Capacities from 27 to 223 GPM
Pressures Up to 100 PSI

This is the same Roper Series 3600 Pump as found in general transfer installations, but with the added feature of a steam chest. A rotary gear unit, it is available with or without relief valve . . . also furnished with gear reduction, if desired.

TWO TYPES OF CONSTRUCTION:

- Spec. 3878 Fitted with Bronze Bearings
- Spec. 4049 All Iron Construction
- All Units Fitted with Aluminum Gaskets and High Temperature Packing

Steam Chest: Located between case and outboard bearing to transfer heat to both pump and packing. A low cost method for handling thick, viscous liquids. Can be used with steam, hot water, or heat transfer oil. Pump and steam chest static tested at 300 PSI. Recommended pressure with steam is 125 PSI.

- Four ports in steam chest for installation convenience.
- Hardened gears and shaft precision ground; steel shaft induction hardened.
- Equipped with high temperature packing (600° F. max.) for effective sealing and long life. Pump fitted with aluminum gaskets.

Send for Bulletin No. 29

See Our Catalog in C.E.C.

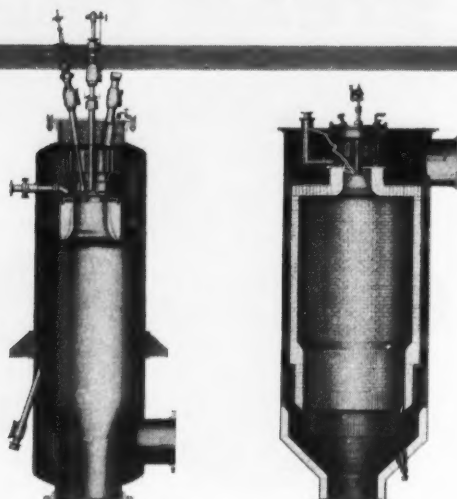
Roper Hydraulics, Inc.
746 Blackhawk Park Avenue
Rockford, Illinois

ROPER
ROTARY PUMPS

Check 5940 opposite last page

The **PEABODY** Direct-Fired

AIR HEATER FURNACE For Process Applications



Available In Two Basic Designs
ALL METAL or REFRACTORY LINED

The Peabody Direct-Fired Air Heater Furnace delivers a controlled volume of hot air and combustion gases for gas turbines, spray dryers, kiln dryers, chemical, food or petroleum processes, catalyst regenerators, and flight shape or aircraft component testing facilities.

FUELS — Liquid or gaseous

PRESSURES — One to 10 atmospheres

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INSTALLATION — Vertical or horizontal

For complete information write for bulletin 600A and the name of your nearest Peabody representative.

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9-218

Check 5941 opposite last page

NEW LITERATURE

CO₂ applications

A brief introduction to 37 ways CO₂ is being used in modern industry is presented in company's new booklet, "Applications Unlimited" — Liquid Carbonic Div., General Dynamics Corp., 3124 S. Kedzie Ave., Chicago 26, Ill.

Check 5500 opposite last page.

Glass pipe, fittings

Illustrated manual of 44 pages fully exposes applications, advantages, physical characteristics, and manufacture of glass pipe fittings. Approximately 75 charts, graphs, photographs, and line drawings are included. Bul PE-3 — Corning Glass Works, Corning, New York.

Check 5942 opposite last page.

Teflon, Kel-F products

Manufacture of molded, extruded, and machined products of Teflon and Kel-F, as well as other customized parts, are discussed in company's catalog of six pages. Product Cat — Fluorulon Laboratories, Inc., Box 305, Caldwell, N. J.

Check 5943 opposite last page.

Chemical catalog

Provides latest information on properties and uses of some 375 basic industrial, pharmaceutical, and agricultural chemicals. 38-page 1957-58 products catalog — Form 160-4 — The Dow Chemical Co., Midland, Mich.

Check 5944 opposite last page.

Spectrophotometers

Sampling equipment and other accessories for manufacturer's infrared spectrophotometer are cataloged in six-page bulletin. Bul 725 — Scientific Instruments Div., Beckman Instruments Inc., 2500 Fullerton Rd., Fullerton, Calif.

Check 5945 opposite last page.

Most Complete

LINE OF ROTARY DRYERS, KILNS HEATERS & COOLERS

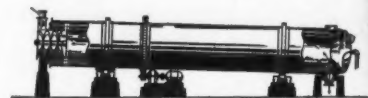
Ruggles-Coles equipment is available in a variety of types and sizes.



Semi-Direct Heat, Double-Shell Dryer, ideal for coal drying.



Indirect-Heat, Double-Shell Dryer for easily-contaminated materials such as kaolin, chalk, etc.



Rotary Steam Tube Dryer designed for raw chemicals.



Single-Shell Dryers, parallel or counter-flow, for most organic materials.



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Rotary kilns for continuous calcining, roasting or oxidizing.



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Sixty years of experience in drying, heating and cooling hundreds of materials is available to prospective users of Ruggles-Coles Equipment.

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Check 5946 opposite last page

CHEMICAL PROCESSING

NEW LITERATURE

Nuclear engineering data

Illustrated folder of four pages describes nuclear engineering services including power generation and reactor facilities, environmental testing, as well as materials manufacturing, processing, and handling. Nuclear engineering folder — Publications Service, Burns and Roe, Inc., 160 W. Broadway, New York 13, N. Y.

Check 5948 opposite last page.

Drier catalyst for paint

Booklet of 32 pages describes synergistic drier catalyst for the paint industry that contains 6% zirconium metal. Zirco® — Advance Solvents & Chemical, Div. of Carlisle Chemical Works, Inc., New Brunswick, N.J.

Check 5949 opposite last page.

Paper stock feeder

Data sheet describes and illustrates variable speed feeder for paper stock. Specifications are listed and operation shown. Bul 187 — Pulp and Paper Mill Div., Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Pa.

Check 5950 opposite last page.

Thermocouples

Catalog of 56 pages describes manufacturer's complete line of thermocouple accessories for measuring temperature. Cat G100-8 — Industrial Div., Minneapolis-Honeywell Regulator Co., Wayne and Windrim Ave., Philadelphia 44, Pa.

Check 5951 opposite last page.

Custom-made pumps

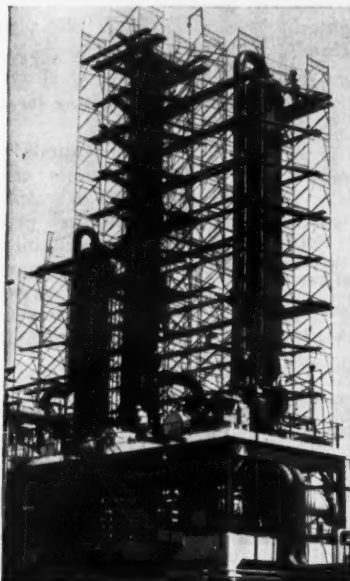
Construction advantages and operating features of open- and enclosed-impeller centrifugal pumps, custom-built to fit a particular operation, are discussed in company's Bul 107 — Frederick Iron and Steel, Inc., Frederick, Md.

Check 5922 opposite last page.

Scaffolding Methods...by Patent Scaffolding Co.



MOVE IT AROUND—For jobs requiring a working surface at a fixed height 3' to 9' above ground or floor level, these aluminum work stands provide the portability of ladders, plus the extra safety and wider application of scaffolding. Ideally suited for reaching hard-to-get-to valves and gauges, inspecting and cleaning tanks, loading and unloading warehoused materials, speeding up a hundred other processing and maintenance jobs. Can be anchored where fixed platforms are required. Platforms of nonskid perforated aluminum vary from 2' to 4' in width, 2' to 8' in length. Special stands for special purposes can be supplied. Write for Bulletin AS-9.



PREFAB PLATFORMS—"Trouble Saver"® Sectional Steel Scaffolding is made of prefabricated frames, diagonal braces, bases and adjustable legs. Frames vary from 2' to 5' wide and from 3' to 6'6" high to provide proper heights and widths of working platforms to fit the job. Here, it gives maintenance crews easy, safe tower access.

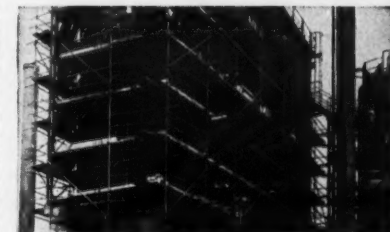
Complete scaffolding equipment and engineering service offered through nationwide sales offices or representatives. Look under Patent Scaffolding in the Yellow Pages for your nearest source.

SALES

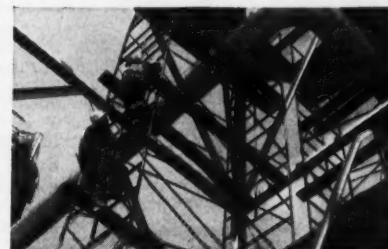
FOR GREATER SAFETY...EFFICIENCY...ECONOMY
THE PATENT SCAFFOLDING CO., Inc.

38-21 12th St., Dept. CP, Long Island City 1, N. Y.
West Coast: 6931 Stanford Ave., Los Angeles 1, Calif.
In Canada: 335 Dufferin St., Toronto
Branches in all principal cities.

RENTALS



AT EVERY LEVEL — Versatile, all-purpose "Tubelox" Scaffolding provides working platforms at every level on coke drum and pipe still sections. Minimum wood staging is required.



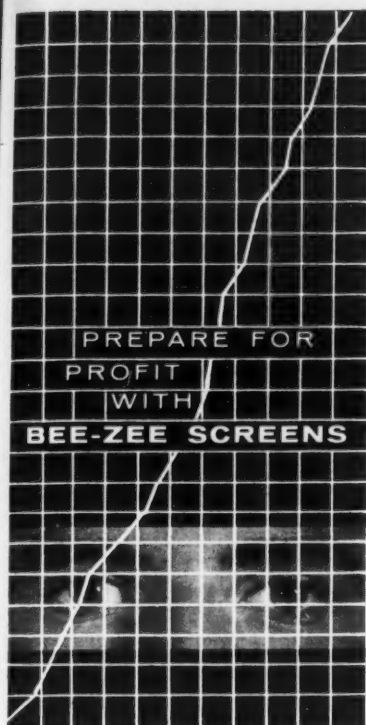
EASY ACCESS—To get up and around heater units, workers quickly assemble "Trouble Saver" Scaffolding frames to exact heights. Built-in ladders speed the job by providing fast, easy access. Wood planks give necessary staging. 100% recoverable, "Trouble Saver" and "Tubelox" Scaffolding can be economically used indefinitely on many types of jobs.

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☐ "Trouble Saver"

Your
Name



■ Product preparation is the strongest single influence on your weekly sales, monthly volume and annual profit. If ordinary screens are giving you ordinary product quality, find out how Bee-Zee Screens are the difference between problems and profit.

Bee-Zee Screens make you money through sharper sizing, better dewatering or deliquifying, non-clogging action and resistance to abrasion. They are stainless steel, precision welded to form the right size, right shape and right dimension screen for your operation and equipment.

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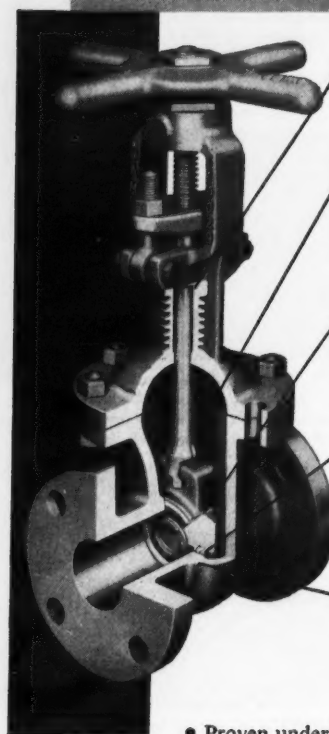
Check 5947 opposite last page

Check 5952 opposite last page

For Safe, Leakproof Shut-off of Liquid Fuels

SPECIFY:

Hamer Vented Chest GATE VALVES



Chevron Packing
Expands as pressure increases to prevent escape at stem.

Chest Vented to Pipe Line
Seal on one side vents chest to pipeline, thus preventing locked-in pressure buildups.

Micro-finish Wedge
Seating surfaces are precision finished for exacting metal to metal fit against seats.

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Located in one side of the wedge only, this seal compresses against valve seat forming an absolute shut-off.

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Integral design eliminates threads, welds & other objectionable surface irregularities.

• Proven under environmental field conditions, these contour engineered Gate Valves seal equally well with line flow in either direction. Seal in one side of wedge vents valve chest to pipeline preventing dangerous pressure buildup. Valves are available in various sizes in a range of metals. Write today for literature and the name of your nearest Hamer representative.



Send for **FREE** Bulletins LTG, VCG ▶

Hamer VALVES INC.

58-18

Box 1851 — Long Beach 1, California

Check 5953 opposite last page

NEW LITERATURE

Screening centrifugal

Operation, features, advantages, and specifications of centrifugal screening unit are described in four-page bulletin. Cutaway drawings show flow of material through unit. Bul 2601 — Dorr-Oliver Inc., Barry Place, Stamford, Conn. Check 5954 opposite last page.

Data logger catalog

Manufacturer's catalog of six pages presents information on its data logger featuring "building-block" construction and flexible pinboard programming. Cat 30A1200 — Fischer & Porter Company, 464 Jacksonville Road, Hatboro, Pennsylvania.

Check 5955 opposite last page.

Describes straddle carrier

Specifications and operating advantages of manufacturer's 12,000-lb capacity straddle carrier are presented in four-page bulletin. Sketches illustrate turning radius. Series 71 straddle carrier bul — Ross Carrier Div., Clark Equipment Co., Benton Harbor, Mich.

Check 5956 opposite last page.

Heat fan data

Illustrated bulletin of four pages describes and shows features of heat fans with temperature range to 1350°F on forward curve line and 1650°F on radial blade line. Bul HF 100-A — General Blower Company, Morton Grove, Ill.

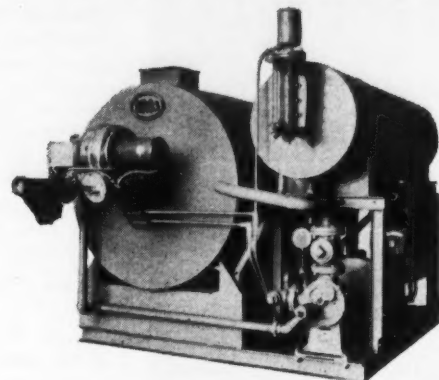
Check 5957 opposite last page.

Anhydrous ammonia data

Manufacturer's bulletin of 12 pages contains specs, applications, properties, and safety practices for anhydrous ammonia. "Ammonia" — Henry Bower Chemical Mfg. Co., Grays Ferry Rd. & 29th St., Philadelphia 46, Pa.

Check 5958 opposite last page.

PROCESS ENGINEERS— INDIRECT HEAT UP TO 600°F AT BELOW 15 PSI PRESSURE



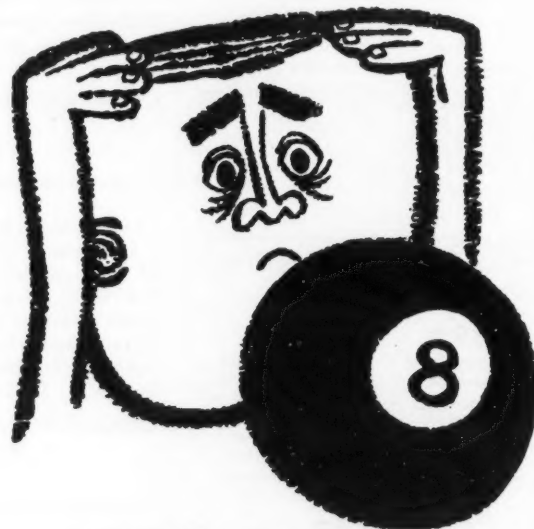
Using mineral oil as the heat transfer medium, the BROS Hi-Heat offers new economy and safety in industrial applications for indirect heat. Positive oil flow provides the uniform, controlled temperatures required for organic synthesis, molding and extruding, and cooking and heating. Fully automatic, electrically operated, Hi-Heat units do not require first-class licensed engineers; operate on widely available crude or bunker fuel oils. Five standard models with hourly BTU output range from 850,000 to 3,650,000. Larger units also available. Sold and serviced through national sales organization. Write for Hi-Heat brochure RE-363.



BROS Incorporated
POWER DIVISION

1057 TENTH AVENUE S.E., Minneapolis 14, Minn.

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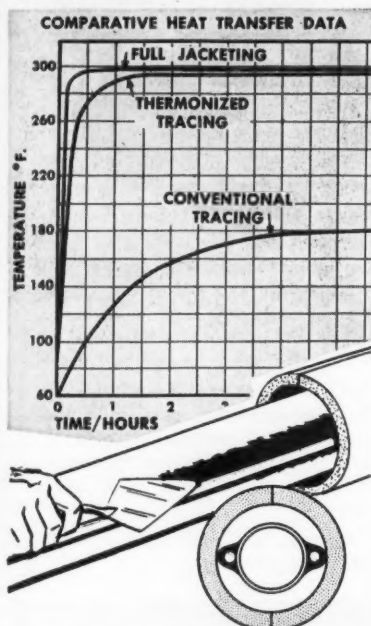
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Thermon is a non-metallic plastic compound with highly efficient heat transfer properties, and is easily applied over either steam traced or electrical resistance systems . . . working equally well for either heating or cooling processes.

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Houston, Texas

Check 5960 opposite last page

NEW LITERATURE

Dust control problem?

Detailed information about dust control systems and how to engineer them is contained in 36-page catalog which describes manufacturer's line of dust collectors. Bul 104 — The W. W. Sly Manufacturing Company, 4650 Train Ave., Cleveland 1, Ohio.

Check 5961 opposite last page.

Miniature dial timer

Features, applications, specifications, and electrical ratings of miniature repeat-cycle dial timer are presented in Bul N-80 — Automatic Timing & Controls, Inc., Subs. of Safety Industries, Inc., King of Prussia, Pa.

Check 5962 opposite last page.

Testing instruments

Catalog of 112 pages illustrates manufacturer's test instruments for paint, paper, plastics, ceramics, food, leather, oil, rubber, and other materials. 1958 Catalog — Gardner Laboratory Inc., PO Box 5728, Bethesda 14, Md.

Check 5963 opposite last page.

Describes cushioned valves

Dimensions, specifications, and installation and operation data of manufacturer's rubber-lined check valves for use in pulp and paper and in chemical industries are presented in four-page bulletin. Bul W-11 — Golden-Anderson Valve Specialty Co., 1206 Ridge Ave., Pittsburgh 33, Pa.

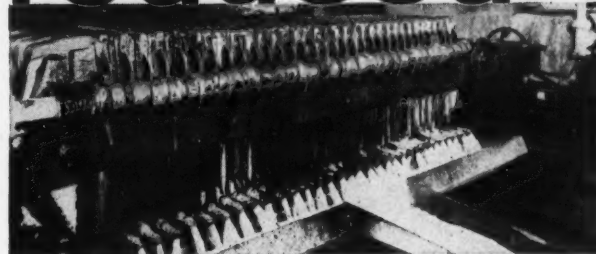
Check 5964 opposite last page.

Details synthetic polymer

Nine-page technical bulletin describes synthetic polymer of aromatic hydrocarbons for use as plasticizer and processing aid for rubber and elastomers. Kenflex® bul — Kenrich Corp., 57-02 48th St., Maspeth 78, N.Y.

Check 5965 opposite last page.

annual filter paper costs reduced 41%



at
ANACONDA
with
NETONE
FILTER
PAPER



- Netone has service life of 12 cycles (old paper lasted one cycle)
- Easier to put on filter press, less installation damage
- Shows excellent resistance to solution shock

At The Anaconda Company, Electrolytic Zinc Plant, located at Anaconda, Montana, Netone filter paper has been used exclusively on the Shriver filter presses since January 1, 1955. Netone is a heavy, neoprene filled paper possessing remarkable wet strength characteristics.

Prior to the use of the Netone paper on the Shriver presses, it was necessary to discard the kraft paper sheets then in use each time a press was cleaned. The life of the Netone paper in the same service is an average of 12 press cycles. Due to its greater wet strength, the Netone paper is less apt to be damaged during installation and has greater resistance to rupture from solution shock when the press is put in service.

Annual filter paper costs have been reduced 41%. The savings in labor and filter down time are also considerable.

Why not try NETONE Filter Paper on your filter? Test samples on request, no obligation, of course.



Weavers of Industrial Filter Media for over Fifty Years

NATIONAL FILTER MEDIA Corporation

General Offices and Mills: New Haven 14, Conn.

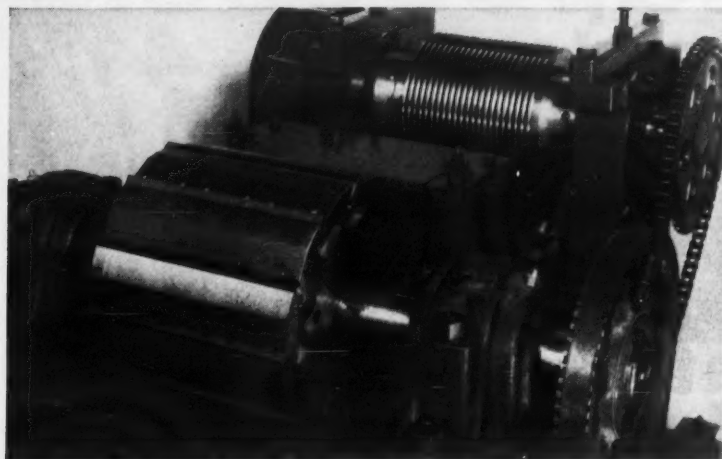
Western Office and Factory: Salt Lake City 10, Utah

Hudson, Ohio: 227 Hartford Drive
Los Angeles, Calif.: 416 West 8th St.
Chicago, Ill.: 6034 N. Cicero Ave.
Elizabeth, Tenn.: Paul Chapman Assoc., Box 787
Toronto: Lee Benner Chem., C. P. R. Roadway, 1119 Yonge Street

Mexico City: Maquinaria Minera, Apartado Postal 2215
Cincinnati, Ohio: Roselawn Center Bldg.
Houston, Texas: 1607 Jefferson Ave.
Pensacola, Fla.: Chem-Quip Co., 1102 Texar Drive
Montreal: Lee Benner Chem., 4700 Prince of Wales

Check 5966 opposite last page

FAST BECOMING STANDARD FOR CUTTING PLASTIC and RUBBER PELLETS



TAYLOR-STILES PELLETIZERS

Because of their superior design, performance, and low cost operation, Taylor-Stiles Plastic Pelletizers are now standard equipment with another of America's leading plastic manufacturers.

If you too, want to produce clean-cut, uniformly sized pellets without fines or longs, it will pay you to investigate these machines.

Taylor-Stiles Pelletizers come in a wide range of types, capacities and sizes to meet your exact pelletizing need. They cut plastic or rubber extruded rods or sheets and calendered sheets — into exact size pellets or blanks — cleanly, without ragged edges, fines or longs. They produce at extremely low cost per pound. Power, maintenance and knife sharpening costs too, are attractively low.

For Rods or Sheet Stock

Taylor-Stiles Pelletizers are available in various types and capacities for pelletizing from rods — or for slitting sheets and cross cutting the strips into pellets. For slitting sheets, prior to cross cutting into pellets, we equip our machines with several different types of circular knives depending on the hardness, plasticity and other characteristics of the material.

Scores of Taylor-Stiles Pelletizers are in use by America's leading producers of PVC, Polyethylene, nylon, and rubber because of the fine end product they produce and their economy.

You, too, need a cleanly cut, uniform product if you are to successfully meet today's keen competition. Ragged cut pellets with fines and longs often cause trouble in extruding and molding and so lose business.

For full details of Taylor-Stiles Pelletizers for plastic and rubber, write today for our folders No. 210 and 213 describing and illustrating our line of dicing cutters and pelletizers.

TAYLOR, STILES & CO.

20 BRIDGE STREET
RIEGELSVILLE, NEW JERSEY

Check 5967 opposite last page

On flotation separation

According to manufacturer's bulletin, production of quality silica sand by flotation separation is now being accomplished with several developmental anionic reagents. Results of four flotation examples using anionic and cationic reagents under various conditions are described. Bul G-14 — The Chemical Div., Armour and Company, 1355 West 31st St., Chicago 9, Ill. Check 5968 opposite last page.

CB Profile — Borden

From page 38

hasn't missed a dividend since 1899).

The year 1952 was also the beginning of a rather noteworthy sales curve rise, brought about principally by these additions to the company.

In 1952: Completed a resorcinol resins plant at Los Angeles, a formaldehyde and liquid urea resin plant in Alabama, and a new chemical research lab in Philadelphia.

In 1953: Bought American Polymer Corp., a vinyl, butadiene-styrene, acrylic, and methacrylic producer with plants in the U.S., Canada, and Brazil.

In 1954: Polymerization facilities were added to the Bainbridge operation.

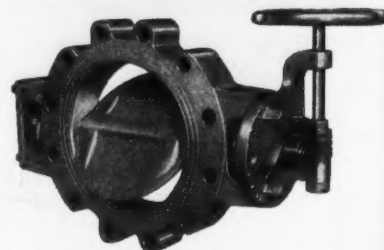
In 1955: Acquired the business of four other companies — American Monomer Corp.; Monomer-Polymer, Inc.; American Resinous Chemicals Corp.; and Reslac Chemicals, Inc. Polymerization units were also added to the Los Angeles plant.

In 1956: Bought Resin Industries and Pioneer Latex and Chemical Company, and started production of PVC at the Leominster, Mass., plant.

In 1957: Acquired Lawrence Process Company, formed Borden Chemical Limited and built a new plant in Toronto. The year also saw expansion of the PVC plant at Leominster, a new formaldehyde and resins operation at Fayetteville, N. C., a formaldehyde

To page 234

ROCKWELL WAFER BUTTERFLY VALVES



For dependable flow control and wedge-tight shut-off of air, gases, steam and any liquids or semi-solids at pressure differential to 150 psi—

For use in power generating, cooling, refrigerating, dust collecting, compressing, processing, refining, gas transmission, combustion control, waste disposal and water works—

For easy, space-saving installation at lower cost.

They're built for
HEAVY DUTY

- Slim-trim—compact.
- Smallest face-to-face dimension; require but one set of flange bolts.
- Lightweight but rugged.
- Made of any metal or rubber-lined.
- Use any manual or automatic operators.
- Standard sizes—4" to 36"; special smaller and larger sizes.

Bulletin 580 tells how they meet your needs.

W. S. ROCKWELL COMPANY

2208 ELIOT STREET
FAIRFIELD, CONN.

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CHEMICAL PROCESSING

ADVERTISERS in this issue

A

Abbé Engineering Co.	107
Abbé Inc., Paul O.	175
Airetool Manufacturing Company	219
Airkem, Inc.	111
Allen-Bradley Co.	185
Allied Chemical Corporation, Baker & Adamson, General Chemical Division	2nd Cover
Allied Chemical Corporation, National Aniline Division	69
Allied Metal Hose Company	232
Allis-Chalmers, General Products Division	125
Allis-Chalmers, Industrial Equipment Division	15
Alloy Steel Products Company	Opp. 110
Alsop Engineering Corporation	92
Aluminum Company of America	86, 145
Amercoat Corporation	4th Cover
American Chain & Cable, Helicoid Gage Division	85
American Chain & Cable, R-P&C Valve Division	44
American Hard Rubber Company, Division of Amerace Corporation	143
American Machine & Metals, Inc., Filtration Engineers Division	47
American Machine & Metals, Inc., Niagara Filters Division	114
American Machine & Metals, Inc., Tolhurst Centrifugals Division	115
American Potash & Chemical Corporation	54
American Steel & Wire Division, United States Steel Corporation	149
American Sterilizer, Industrial and Scientific Division	11
Ampco Metal, Inc.	152
Anderson Company, The V. D., Division of International Basic Economy Corporation	126
Antara Chemicals, A Sales Division of General Aniline & Film Corporation	39
Appleton Electric Company	189
Archer-Daniels-Midland, Chemical Products Division	58
Armstrong Machine Works	176

B

Babcock & Wilcox Co., The, Refractories Division	25
Babcock & Wilcox Company, The, Tubular Products Division	215
Bailey Meter Company	131
Baker & Adamson, General Chemical Division, Allied Chemical Corporation	2nd Cover
Ballymore Company	186
Barber-Colman Company	137
Barco Manufacturing Co.	234
Barnstead Still & Demineralizer Co.	37
Bauer Bros. Co., The	45
Beach-Russ Company	200
Becco Chemical Division, Food Machinery and Chemical Corporation	43
Beetle Plastics Corp., Carl N., a Subsidiary of Crompton and Knowles Corporation	203
Belmont Packing and Rubber Company, The	146
Bin-Dicator Co., The	212
Binks Manufacturing Company	71
Bird Machine Company	7
Bisonite Company, Inc.	37
Bixby-Zimmer Engineering Co.	227
Brooks Rotameter Company	210
Bros Incorporated, Power Division	228
Buffalo Forge Company	89
Buffalo Meter Co.	129

C

Callery Chemical Company	37, 67, 71
Cambridge Instrument Co., Inc.	134
Cambridge Wire Cloth Co., The	202
Camco Products, Inc.	14
Carborundum Metals Company, The, Division of The Carborundum Company	96

Carver Inc., Fred S.	214
Catawissa Valve and Fittings Company	150
Celcote Co., Inc., The	148
Celanese Corporation of America, Chemical Division	53
Cellulastic Corporation	166
Chemical and Power Products, Inc.	188
Chempump Corporation	106
Chemtrol, Division of Tapered Air Products Corporation	92
Chiksan Company, A Subsidiary of Food Machinery and Chemical Corporation	17
Cleveland Vibrator Co., The	210
Columbia-Geneva Steel Division, United States Steel Corporation	149
Coddington Mfg. Co., E. D.	216
Combustion Engineering, Inc., Raymond Division	217
Commercial Solvents Corporation	62
Continental Can Company	165
Cooper Alloy Corporation, Valve & Fitting Division	140
Coppus Engineering Corporation	212
Crane Co.	103, 104
Crane Packing Co.	72

D

Darling Valve & Manufacturing Co.	214
Darnell Corporation, Ltd.	16
Davison Chemical Company, Division of W. R. Grace & Co.	55
Day Company, The	101
Diamond Alkali Company	68
Diamond Chain Company, Inc., A Subsidiary of American Steel Foundries	169
Dietert Co., Harry W.	126
Dodge & Olcott, Inc.	34
Doré Co., John L.	142
Dorr-Oliver, Incorporated	172
Dow Chemical Company, The	33, 93
Dow Corning Corporation	54
Downingtown Iron Works, Inc., Division of Pressed Steel Tank Company	82
Draco, Division of Fuller Co.	3
Dravo Corporation	196
Ducon Company, The, Inc.	205
Du Pont de Nemours & Co (Inc.), E. I., Elastomers Chemicals Dept.	3rd Cover
Durametallic Corporation	88
Dwyer Mfg. Co., F. W.	220

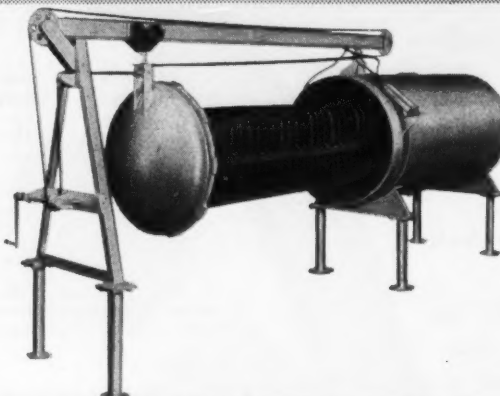
E

Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Chemical Division	65
Eco Engineering Division, Economy	
Faucet Co.	194
Eimco Corporation, The	73
Electric Auto-Lite Company, The, Industrial Instrument Division	128
Electric Steel Foundry Company	154
Eriez Manufacturing Company	99
Ertel Engineering Corporation	182

F

Fairbanks, Morse & Co.	83
Falcon Manufacturing, The, Division of The First Machinery Corp.	225
Falk Corporation, The	187
Felt Products Mfg. Co.	196
Filter Paper Co., The, Filpaco Industries	224
Filtration Engineers, American Machine and Metals, Inc.	47
Fisher Scientific	124
Flexrock Company	234
Foremost Food and Chemical Company, El Dorado Division	14
Foster Co., Benjamin	153
Foxboro Company, The	135, 138-139
Frantz Co., Inc., S. G.	175
Frederick Iron and Steel, Inc.	223
Fritzsche Brothers, Inc.	221
Fuller Company, Subsidiary of General American Transportation Corporation	Opp. 111

Right-for your requirements SHRIVER PRESSURE LEAF FILTERS

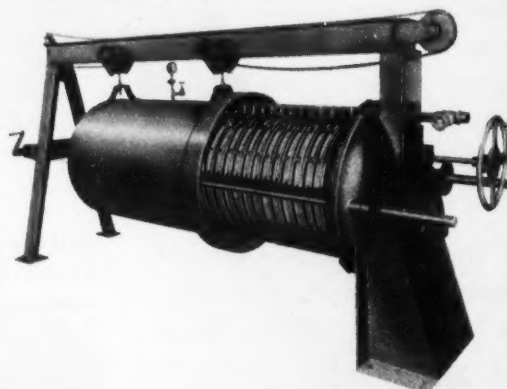


Horizontal Tank Vertical Leaf

For large volume clarification and for quick cake discharge. Made in full range of tank sizes and filter areas in steel and stainless steel.

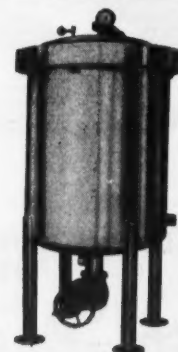
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Vertical Tank Vertical Leaf

For rapid precoat clarification of liquids with low solids content. Wide range of sizes and selection of materials of construction.



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A NEW stock answer to pipeline problems
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1 1/2"	
2"	

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(ALLIED A, B, C, D)

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Check 5971 opposite last page

G

Gaylord Container Corporation, Division of Crown Zellerbach Corporation	163
General American Transportation Corporation, Louisville Drying Machinery Unit	40
General American Transportation Corporation, Turbo-Mixer Division	183
General Electric Co., Lamp Glass Dept.	72
General Electric Co., Silicone Products Department	41
Gifford-Wood Co.	170
Girdler Process Equipment Division, National Cylinder Gas Company	177
Glas-Col Apparatus Company	208
Goodall Rubber Company	38
Goodrich Chemical Company, B. F.	144
Goslin-Birmingham Manufacturing Co., Inc.	100
Graver Tank & Mfg. Co., Inc., Alloy Division	80
Grip-Hoist, Inc.	220
Gump Co., B. F.	105

H

Hall Co., The C. P.	67
Hamer Valves, Inc.	228
Hardinge Company, Incorporated	226
Harshaw Chemical Company, The	26
Hart-Carter Co.	223
Haws Drinking Faucet Company	186
Hayes & Stolz Manufacturing Co., Inc.	166
Helicoid Gage Division, American Chain & Cable	85
Hercules Powder Company, Incorporated	70
Heyl & Patterson Inc.	110
Highside Chemicals Incorporated	224
Hoke Incorporated	132
Hough Co., The Frank G., Subsidiary International Harvester Company	8
Howe Scale Co., The, A Subsidiary of Safety Industries, Inc.	170

I

I-T-E Circuit Breaker Company, Transformer and Rectifier Division	133
Illinois Testing Laboratories, Inc.	210
Illinois Water Treatment Co.	222
Industrial Filter & Pump Mfg. Co.	118
Industrial Marking Equipment Co., Inc.	205
Industrial Nucleonics Corporation	20
Inflico Inc.	206
Ingersoll-Rand	116
Inland Steel Container Company, Member of the Inland Steel Family	160
International Nickel Company, Inc.	87, 119, 213

J

Jamesbury Corp.	12
Jeliff Manufacturing Corporation, The C. O.	48
Jenkins Bros.	147
Jerguson Gage & Valve Company	210
Johns-Manville	120-121, 211
Johnson Corporation, The	224
Joy Manufacturing Company	173

K

Kates Company, W. A.	128
Kellogg Company, The M. W., A Subsidiary of Pullman Incorporated	79
Kerotest Manufacturing Company	200

L

LaBour Company, Inc., The	209
Ladish Co., Tri-Clover Division	201
Lammert & Mann Co., Inc.	206
Lamtex Industries, Inc.	146
Lapp Insulator Co., Inc., Process Equipment Division	102
Link-Belt Company	161, 171
Liquid Carbonic, Division of General Dynamics Corporation	63
Louisville Drying Machinery Unit, General American Transportation Corporation	40
Lovejoy Flexible Coupling Co.	192

M

Mack Iron Works Company, The	78
Magnum, Inc.	136
Manton-Goulin Manufacturing Co., Inc.	142
Manufacturers Equipment Company, The	182
Manzel, A Unit of Houdaille Industries Inc.	192
Marietta Concrete Corp., The	168

Marsh Instrument Co., Sales affiliate of Jas. P. Marsh Corp.	220
Martin Engineering Company	225
Master Builders Co., The, Division of American-Marletta Company	112
Mathieson Chemicals	52
Maxwell Brothers, Inc.	164
Mechanical Products Corporation	130
Metal Textile Corp.	78
Metal & Thermit Corporation	68
Metals Disintegrating Company, Inc.	181
Micro Switch, A Division of Honeywell	123
Milton Roy Company	108
Minerals & Chemicals Corporation of America	60-61
Mixing Equipment Co., Inc.	174
Moisture Register Co.	19
Molded Fiberglass Tray Co.	166
Momart Industries	206
Monsanto Chemical Company, Organic Chemicals Division	64
More-Milford Corporation	130
Mortell Company, J. W.	112

N

Nagle Pumps, Inc.	48
Narda Ultrasonics Corporation, The, Subsidiary of The Narda Microwave Corporation	204
National Air Vibrator Co.	112
National Aniline Division, Allied Chemical Corporation	69
National Business Publications, Inc.	198
National Distillers and Chemical Corporation, U. S. Industrial Chemicals Co. Division	86-87
National Engineering Company, Simpson Mix-Muller Division	18
National Filter Media Corp., The	229
National Lead Company	24
National Oats Company, Dura-Bucket Division	112
National Tube Division, United States Steel Corporation	149
Neff & Fry Company	88
Neptune Meter Company	202
Newark Wire Cloth Company	233
Niagara Blower Company	88
Niagara Filters Division, American Machine and Metals, Inc.	114
Nordstrom Valve Division, Rockwell Manufacturing Company	84

O

O'Brien Industries	143
O'Brien Industries	143
Olin Mathieson Chemical Corporation, Industrial Chemicals Division	52
Olin Mathieson Chemical Corporation, Organic Chemicals Division	35
Oxy-Catalyst, Inc.	196

P

Parks-Cramer Company	134
Pasadena Hydraulics, Inc.	136
Patent Scaffolding Co., Inc., The	227
Pawtucket Manufacturing Company	152
Peabody Engineering Corporation	226
Pennsalt Chemicals Corporation	10
Pennsylvania Department of Commerce	219
Perfetting Service Co.	220
Perkin-Elmer Corporation, Instrument Division	207
Pioneer Rubber Company, The	184
Pipe Fabrication Institute, The	21
Pitt-Consol Chemical Company, A Subsidiary of Consolidation Coal Co.	16
Pittsburgh Coke & Chemical Co., Protective Coatings Division	151
Potts Company, Horace T., Speedline Stainless Steel Fittings Division	5
Prater Pulverizer Company	92
Puget Sound Fabricators, Inc.	224
Pulverizing Machinery Division, Metals Disintegrating Company, Inc.	181
Putnam Publishing Company	134, 228

Q

Quaker Oats Company, The, Chemicals Department	58, 66
--	--------

R

R-P&C Valve Division, American Chain & Cable	44
Rapids Machinery Company	204
Raymond Bag Corporation, A Division of Albermarle Paper Mfg. Co.	158
Raymond Division, Combustion Engineering, Inc.	217
Read Standard A Division of Capitol Products Corporation	94
Renneburg & Sons Co., Edw.	222
Republic Steel, Steel and Tubes Division	221
Resistoflex Corporation	97

CHEMICAL PROCESSING

Robertshaw-Fulton Controls Company, Aeronautical and Instrument Division	19
Robbins & Myers, Inc.	13
Rockwell Company, W. S.	45, 230
Rockwell Mfg. Co.	234
Rockwell Manufacturing Company, Nordstrom Valve Division	84
Rohm & Haas Company	56
Roper Hydraulics, Inc.	225

S

Saran Lined Pipe Company	93
Sarco Company, Inc.	190-191
Schutte and Koerting Company	182
Selas Corporation of America	116
Sharples Corporation, The	178-179
Shell Chemical Corporation, Chemical Sales Division	9
Shriver & Company, Inc., T.	231
Simpson Co., The Orville	221
Simpson Mix-Muller Division of National Engineering Co.	18
Sindar Corporation	67
Solar Aircraft Company	113
Sonneborn Sons, Inc., L., White Oil, Petroleum & Sulfonate Division	59
Southwestern Engineering Company	204
Sparkler Manufacturing Co.	81
Speedline Stainless Steel Fittings Division, Horace T. Potts Company	5
Spray Engineering Co.	216
Sprout-Waldron	182
Square D Company	214
Standard Conveyor Company	162
Stearns Magnetic Products, A Division of The Indiana Steel Products Company	159
Steel and Tubes Division, Republic Steel Corporation	221
Steelcote Mfg. Co.	116
Strahman Valves, Inc.	137
Struthers Wells Corporation	46
Sturtevant Co., P. A.	214
Sturtevant Mill Company	78
Sun Ship Building & Dry Dock Co.	44
Surety Rubber Co., The	196

T

Taber Pump Co.	148
Taylor Instrument Companies	127
Taylor, Stiles & Co.	230
Tennessee Coal & Iron Division, United States Steel Corporation	149
Tennessee Corporation	12
Thermal Research & Engineering Corp.	4
Thermo Electric Co., Inc.	126
Thermon Manufacturing Co.	229
Toledo Scale, Division of Toledo Scale Corporation	218
Tolhurst Centrifugals Division, American Machine and Metals, Inc.	115
Tote System, Inc.	168
Trent, Inc.	130

Trerice Co., H. O.	212
Turbo-Mixer, A Division of General American Transportation Corporation	183

U

Uehling Instrument Co.	136
Uhrden, Inc., Dumper Division	162
Union Asbestos & Rubber Company	199
Union Carbide Corporation, Visking Division	167
U. S. Industrial Chemical Co., Division of National Distillers and Chemical Corporation	Bet. 86-87
U. S. Stoneware, Plastics & Synthetics Division	117
United States Gasket Company, Plastics Division of Garlock	150
United States Gauge, Division of American Machine and Metals, Inc.	124
United States Steel Corporation	149
United States Steel Export Company, United States Steel Corporation	149
United States Steel Supply Division, United States Steel Corporation	149
Universal Metal Hose Co.	234
Universal Oil Products Company	77

V

Vanton Pump & Equipment Corp., Division of Cooper Alloy Corp.	98, 216
Vapor Heating Corporation	180
Visking Company, Division of Union Carbide Corporation	167
Vogt Machine Co., Henry	197
Vulcan Containers Inc.	157

W

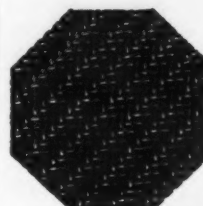
Wall Colmonoy Corp.	153
Warren Pumps, Inc.	218
Weighing and Control Components, Inc.	129
Wellington Sears Company	193
Western Precipitation Corporation	49
Weston Instruments, Division of Day-Strom Inc.	122
Williams & Co., C. K.	71
Williams Gauge Co., Inc., The	188
Wilnot Castle Company	22-23
Wolverine Tube Division of Calumet & Hecla, Inc.	Bet. 182-183
Worcester Valve Co., Inc.	34

Y

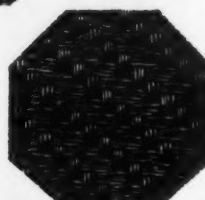
Yale & Towne Manufacturing Co., The, Yale Materials Handling Division	156
Yeomans	195
Young Brothers Co.	212
Youngstown Steel Tank Company, The	84

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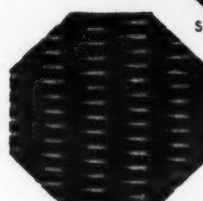
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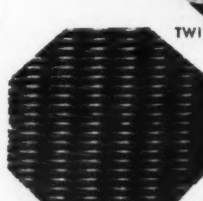
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CB Profile — Borden

From page 230

plant at Kent, Wash., and expansion of the butadiene-styrene facilities at Illiopolis, Illinois.

This succession was topped off in 1958 by the redesignation of the chemical division as Borden Chemical Company.

Integration

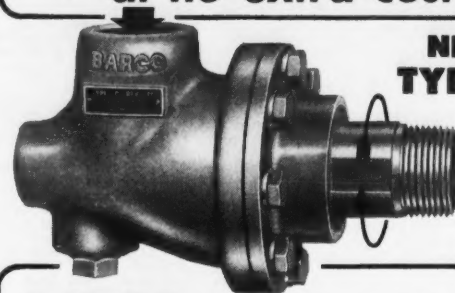
What are the main problems of making a well integrated, working organization out of a heterogeneous collection of companies in such a short time? "No outstanding problems," explains Marusi. "If any one area offers some difficulty, perhaps it's sales — but still not serious. The companies we've acquired were wanted not for their markets necessarily, or for their physical plants, so much as for the work that they were doing. Because of that we've had to make no abrupt changes in the companies or their staffs and consequently have had little trouble with integration."

We asked Marusi about the future for the company. "As I explained, we feel that this is a time now for internal growth — we've got to work whatever kinks there are out of the organization. Of course, we're very interested in some new developments — mostly



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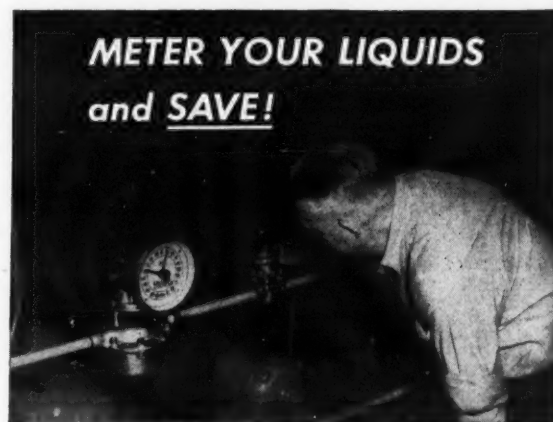
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5447	5501	5555*	5608	5663
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5452	5506	5560	5613	5668
5453	5507	5561	5614	5669
5454*	5508	5562	5615	5670
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5458	5512	5566*	5619	5674
5459	5513	5567	5620	5675
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5461	5515	5569	5622	5677
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5463	5517	5571*	5624	5679
5464	5518	5572	5625	5680
5465	5519	5573	5626	5681
5466	5520	5574	5627	5682
5467*	5521	5574A	5628	5683
5468	5522	5575	5629	5684*
5469	5523	5576	5630	5685
5470	5524	5577*	5631	5686
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5472	5526	5579	5632A	5688
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5748	5788	5828	5866	5906	5945
5749	5789	5829	5867	5907	5946
5750	5790	5830	5868	5908	5947
5751	5791	5831	5869	5909	5948
5752	5792	5832	5870	5910	5949
5753	5793	5833	5871	5911*	5950
5754	5794*	5834*	5872	5912	5951
5756	5795	5835	5873	5913	5952*
5757	5796	5836	5874	5914	5953
5758*	5797	5837	5875	5915	5954
5759	5798	5838	5876	5916	5955
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5777	5816	5855	5895	5934	5973
5778	5817	5856	5896	5935	5974
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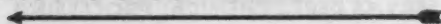
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CB Profile — Borden

From page 234

in the general field of polymers for coatings and adhesives.

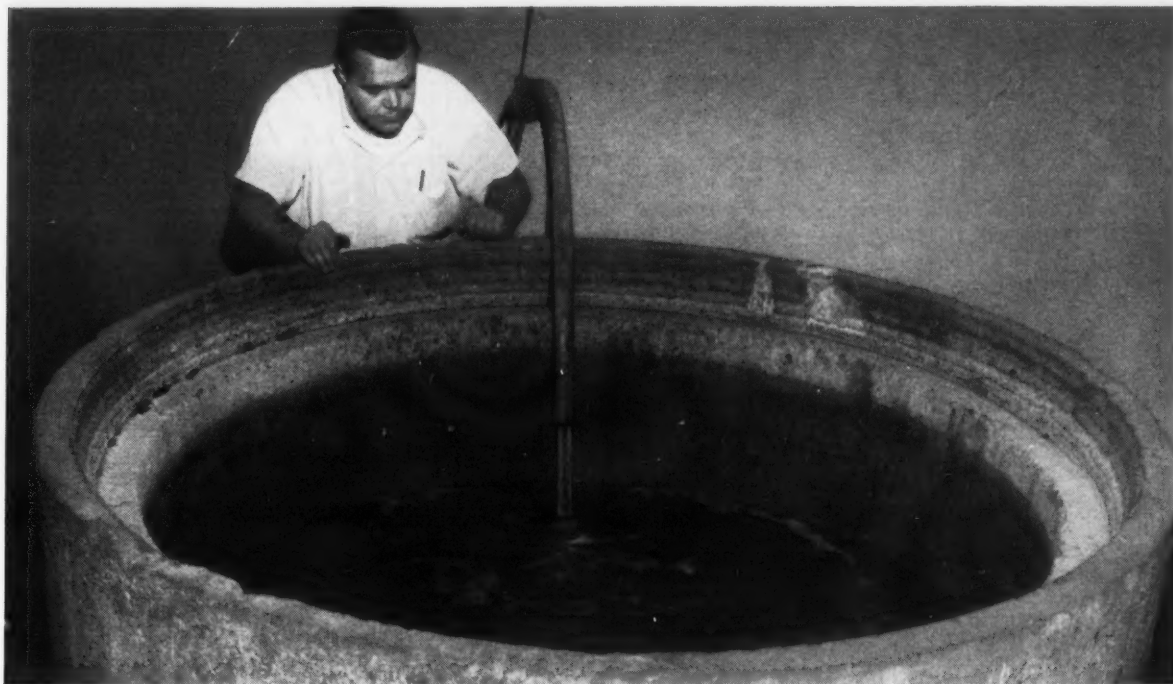
"An area that, we feel, offers tremendous potential is rigid PVC in architecture and construction. PVC may well fill the roll of the 'poor man's stainless steel' in a lot of applications. As a matter of fact, PVC although it has an extremely big market now, has its real growth and utility still ahead of it. In food packaging, for instance, PVC hasn't been used because of the fact that it has needed plasticizers up to now. But there's a process in Germany — not completely developed, of course, but showing considerable promise — that can produce calendered PVC film without use of any plasticizer at all. This can very well open up a host of new markets for the material.

"The whole field of adhesives offers a remarkable growth potential. It wasn't very long ago that glue was glue. It's progressed now to the point where the Air Force's new B-58 is put together in large measure with adhesives. And we see this as only the beginning."

"The tail wagging the dog"

While the chemical company is a good money maker in its own right, it offers other advantages to the parent. While Borden is still entering new milk markets and expanding its business somewhat, the amount of market saturation for the company is rapidly reaching a point of diminishing returns. The bulk of its growth from now on will be pretty closely tied to the growth of the population and the economy.

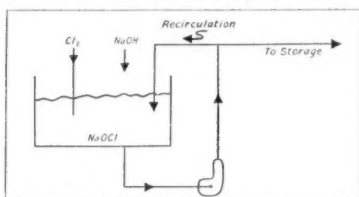
This, of course, isn't true of the chemical company. While chemicals represents about five percent of the total company sales now — actually a little over \$47 million compared to the parent's \$931 million last year — it's entirely conceivable that the chemical portion of Borden's sales will grow by leaps and bounds over the next few years. It's doubtful that this chemical tail will wag the dog for a number of years but it's sure to be a growing factor as time goes by.



HYPALON hose, in continuous use since May, 1954, recirculates bleach solution (diagram) and transfers it to storage vat shown above.

HYPALON® hose cuts bleach plant replacement costs

John Wiley Jones Company of Charlotte, North Carolina, manufactures bleach for laundries, paper mills and textile houses. In the manufacturing process, sodium hydroxide, 26° Baumé is pumped into vats, chlorine is added, and the blending of the two



chemicals produces sodium hypochlorite. HYPALON hose is used to recirculate the solution during production

and to transfer the bleach to storage.

The hose is used intermittently 8 hours a day, 6 days a week, and is immersed in the vats to prevent spray and spilling. Pressure is about 20 psi, and temperature range is 40-100° F. Ordinary rubber hose, used previously, had to be replaced every few months because bits of rubber, shredded from the hose by chemical attack, contaminated the bleach.

John Wiley Jones Co. started using the HYPALON hose in May, 1954. Since then it has been in continuous use without contaminating the bleach. There have been no maintenance or replacement costs since its installation.

In service such as this, HYPALON's

balanced combination of properties pays off in long service, less maintenance. Although usually referred to as acid hose, HYPALON hose might be better termed "chemical hose." It has proven effective for both alkaline and acid service, particularly where strong oxidizing agents are encountered.

In addition, Du Pont HYPALON synthetic rubber is resistant to heat (250-350° F.), ozone, abrasion, flex cracking and weathering. It is used in a wide variety of applications where conditions are severe. Tank linings, gaskets, protective clothing are examples. Mail the coupon below for more information on HYPALON... and neoprene, the synthetic rubber made by Du Pont for over 25 years.

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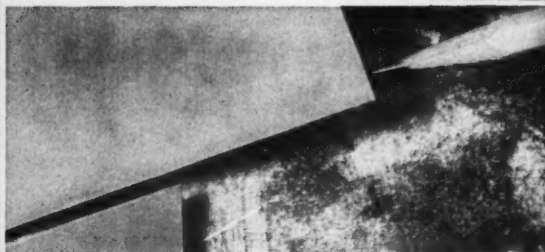
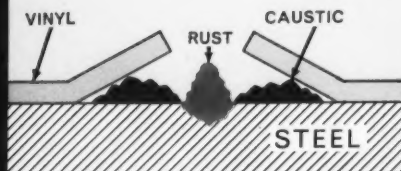
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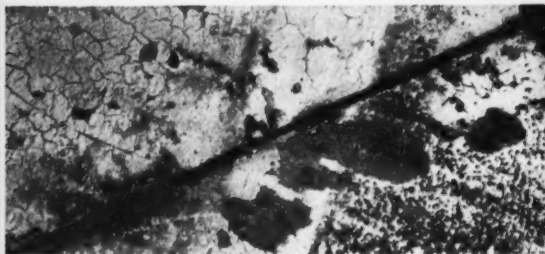
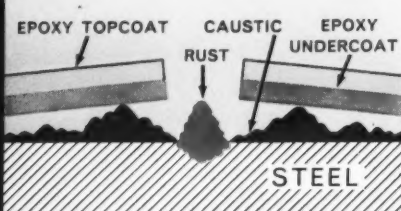
Here are tests you can duplicate



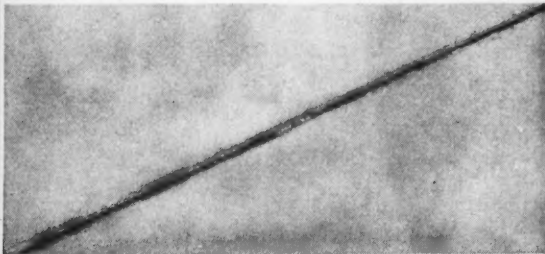
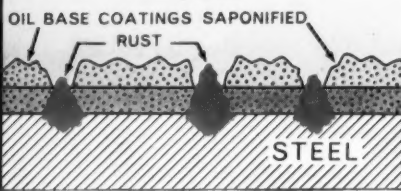
TEST 1—One coat of self-priming vinyl. Coating breaks away (L) due to severe undercutting (R), exposing metal to progressive corrosion.



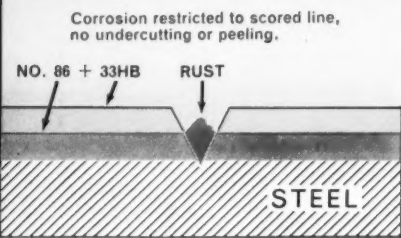
TEST 2—Epoxy primer, epoxy topcoat. Coating lifts off in single sheet (L) as adhesion fails (R), exposing entire surface to corrosion.



TEST 3—Oil primer, oil topcoat. Both coats fail completely (L) as underfilm caustic reacts on their oils to form soaps (R).



TEST 4—Amercoat's No. 86 inhibitive primer and No. 33HB vinyl topcoat. Corrosion restricted to scored line (L), no undercutting or peeling (R).



The purpose of these accelerated tests is to show what happens when various types of coatings are exposed to a typical corrosive environment. Four clean steel panels, free from mill scale and rust, were coated with different combinations of primers and topcoats. Each was scribed to bare metal and immersed in salt water in the presence of free oxygen, for two weeks.

As caustic deposits formed over cathodic areas of the steel in tests 1, 2 and 3, failure occurred in three ways. The vinyl, though not directly attacked, was undercut as caustic

spread beneath the film and destroyed adhesion. The epoxy coating, known for critical adhesion to smooth metal, proved impervious to caustic attack. It was, however, lifted in its entirety as moisture spread beneath the surface. The entire oil paint film was quickly penetrated by the salt solution, creating widespread corrosion and caustic formation. The caustic then reacted with the oil to saponify the film.

In the fourth test the corrosion was limited to the score mark. Reason: Amercoat No. 86 Primer resists undercutting and adheres tenaciously,

inhibiting electrolytic corrosive action.

The conclusions are clear. To provide long term protection in corrosive service, start with Amercoat No. 86 Primer, which provides a sound and lasting base for quality topcoats such as Amercoat No. 33HB.

Write today for complete data on Amercoat No. 86, and have the details on hand when planning your next important coating job.

Amercoat
CORPORATION

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